DEC 5 19
BUS. ADM. LIBRARY

JOURNAL of FARM ECONOMICS

Contents

DEFENSE AND WAR

Foods for Defense ..... *John B. Canning* 697

Fundamental Elements in the Current Agricultural Situation ..... *John D. Black* 712

An Agricultural Policy for Hemisphere Defense ..... *Francis A. Linville* 726

OTHER ARTICLES

Social Conflicts and Agricultural Programs ..... *Kenneth H. Parsons* 743

Training of Personnel for the Rural Social Sciences ..... *M. R. Benedict* 765

Economics of Joint Costs in Agriculture ..... *S. v. Ciriacy-Wantrup* 771

Conservation—An Objective or an Ideal? ..... *Neil W. Johnson* 819

Recent Developments Among Farm Labor Unions ..... *Harry Schwartz* 833

Shape of Total Revenue Curves ..... *Adolf Kozlik* 843

Insurance Aspects of Extra-risk Mortgage Loans ..... *Donald C. Horton* 855

Development of "Normal" Citrus Fruit Yields by Tree Ages for Use in a Yield Insurance Plan ..... *Ralph R. Botts* 867

Published by

THE AMERICAN FARM ECONOMIC ASSOCIATION

Volume XXIII NOVEMBER, 1941 Number 4

Contents (*Continued*)

NOTES

Distribution of Farm Benefit Payments ..... *O. B. Jesness* 873
Common Errors in Evaluating Farm Practices ..... *George W. Collier* 877
A Comparison of Graphic and Pearsonian Co-efficients of Correlation of Data Drawn from a Noncorrelated Universe .... *Warren C. Waite* 884
Lewis on Relation of Income to Farm Capital ..... *L. J. Norton* 888
Note on Part-time Farming ..... *C. A. Boonstra* 893
Family Interest in the Ownership of Farm Land ..... *H. W. Hannah* 895
Merits and Limitations of Some of the Measures of Land Classes ..... *R. O. Bausman* 899

PUBLICATIONS RECEIVED 904

REVIEWS 907

Thomas, Dorothy Swaine, Social and Economic Aspects of Swedish Population Movements, 1750–1933 ..... *Conrad Taeuber* 907
Hopkins, John A., Changing Technology and Employment in Agriculture ..... *K. H. Parsons* 909
Rosen, S. McKee, and Laura Rosen, Technology and Society .. *R. S. Kifer* 913
Davis, Harold T., The Theory of Econometrics ..... *Holbrook Working* 916
Galloway, George B. and Associates, Planning for America .. *O. B. Jesness* 918
Kraenzel, Carl F. and O. A. Parsons, Agricultural Planning, Its Economic and Social Aspects ..... *Roy E. Huffman* 920
Mitchell, Donald R., Farm Accounting ..... *Paul Williamson* 921
Farnsworth, Helen C., Wheat in the Post-Surplus Period, 1900–09, with Recent Analogies and Contrasts ..... *D. B. DeLoach* 922
Cummings, Richard Osborn, The American and His Food ..... *Herman M. Southworth* 923
Dowell, Austin A. and Knute Bjorka, Livestock Marketing ..... *Henry H. Bakken* 926
Thompson, Sam H., Economic Trends in Livestock Marketing ..... *Paul L. Miller* 927
Illinois Tax Commission, Drainage District Organization and Finance 1870–1937 ..... *Joseph Ackerman* 928

NEWS ITEMS 930

MEMORIAL 936

PRELIMINARY PROGRAM FOR THE ANNUAL MEETING 938

INDEX TO VOLUME XXIII 945

Price: $5 per year, this issue $1.25

Entered as second class matter at the post office at Menasha, Wis. Acceptance for mailing at a special rate of postage provided for in the Act of February 28, 1925, paragraph 3, section 412, P. L. & R., authorized November 27, 1931.

JOURNAL
OF
FARM ECONOMICS

Vol. XXIII November, 1941 No. 4

FOODS FOR DEFENSE*

JOHN B. CANNING
Stanford University

Part I

1. *Recent Production and Consumption Rates*

FIRST OF all, let me review a hierarchy of facts. Since 1916—you will hear that date again—our production rates per capita have fallen heavily in several broad categories of foods. These declines are accounted for by two concurrent sequences. Our exports of agricultural commodities have declined by a magnitude represented by two billion dollars worth a year. For the matter in hand the sales dollars do not matter, but the decline in the physical producing rates does matter.

In several broad categories of foods per capita consumption rates have also declined. Since these include meats, poultry products, dairy products and vegetables, these declines are important: so also are the concomitant declines in production rates.

In meats I cite, as extreme example, beef. With thirty million more mouths to feed, we have about four million fewer beef cattle in our herds than we had in 1916. Consumption on a basis of edible portions of animal meats per capita had fallen over fifteen per cent by the beginning of 1940. To have sustained during the thirties the per capita consumption of meats prevailing in the world war decade, we should have had to raise and feed to animals the equiva-

* Read before the Western Farm Economics Association, June 25, 1941, at Salt Lake City, Utah.

Author's note: In preparing this speech I drew heavily upon the ideas expressed by others in numerous letters, critical memoranda and conversations. For their generous help in these ways I am especially indebted to Professors M. R. Benedict and H. R. Wellman of the University of California, to Dr. J. W. Tapp of the Bank of America, to Dr. E. G. Nourse of the Brookings Institution, to many members of the United States Department of Agriculture, and to my Stanford colleagues, Dr. M. K. Bennett, Dr. Karl Brandt and Dr. J. S. Davis. The responsibility, however, is wholly mine.

lent of a billion bushels of corn a year more than we did raise and feed in the latter decade.

As a category the twenty-two leading fresh vegatables show a large decline in per capita consumption rates. This, both on a basis of dry weight of edible portions and on a basis of each of the important nutrients.

To be sure, some vegetables have gained. But the greatest gains are shown by the items, like head lettuce and celery, that have least nutritive values per pound, are most expensive to grow and are eaten mostly by people in the upper half of the income distribution. The heaviest declines are in potatoes and sweet potatoes. These have fallen over one-tenth since 1924. Though these are the cheapest of vegetables, they are not cheap food. Low income families eat far less potatoes than high income families do—and eat least potatoes in winter when their diets are lowest in other vegetables as well.

Though fruits eaten per capita have risen, seven-tenths of the rise is accounted for by citrus fruits and fresh grapes. The great bulk of the current rise of these is accounted for by families over the $2400 a year level. The cheapest domestic fruit, apples, shows a thirty-nine per cent loss in per capita consumption between 1925 and 1939. Apples now rank below oranges in weight used.

But even the higher per capita production rates of 1915 and 1916 were not high enough to stand the great bulges of buying in 1917 and 1918 for military stocks and exports to allies. Within the last year all of us have heard (and said) a great deal about that bit of economic history. But we have talked about long run and short run markets, elasticities of demand for foods, cost of living, inflation, war prosperity of farmers, price controls and rationing. Nearly all we have heard and said has been smothered in dollar signs or distorted by unit price multipliers. Such figures, by their false simplicity, obscure our national folly. The primary folly consists of needless failure to produce enough. The primary harm is done to those who cannot pay the resultant high prices—not to those who can pay them.

A strict physical accounting for what food was left—after the great bulges of buying and diverting for war stocks and exports in the war years—tells the real story: not enough customary appetizing foods to eat—not enough milk and butter and eggs and meats and fruits and vegetables to sustain a healthy working population

at a high level of efficiency, and their dependents in comfort. All our data on the period show a sharp falling off in productivity per man-hour that continued two or three years after the war.

That folly could have been averted by a planned stepping-up of food production to the limit of capacity during 1915 and 1916 when, as now, the shadows of war were rising higher and higher above our economic horizon.

Thus far I have stuck to facts that are easily verifiable. My analyses of them are in substantial accord with those made in the Department of Agriculture. They throw interesting light on the "surpluses" of recent years.

On the Bellman's principle of "what I say three times is true," we believed devoutly in food surpluses. With minor exceptions they had no reality except that production rates per capita did not fall quite so fast as the sum of net export and consumption rates per capita. Popular belief about these surpluses is all the more a delusion because it is shared by a hundred million people.

By standards now obsolete, these market remainders were once real. But we are on a long course now: match play: scratch. By timely standards suited to our prospects these surpluses are all spurious. It is time to strip naked all the hypocrisy about "the paradox of want in the midst of plenty." The want was genuine enough to millions. On a basis of national aggregates there was not, and there is no, plenty. Hence there was not, and there is no, paradox.

By timely standards there is now no surplus of any food, foodstuff, feed grain or forage. Too much corn in the crib and wheat in the bin? Yes, but only because there has not been and there is not enough corn and wheat on their way to ham and eggs and milk for us and for our allies. Had we fed out, in the previous twelve months, the whole of our prospective stocks of grain at the coming end of the crop years, our grain would just about have brought our per capita rates of supply in animal proteins and fats up to bogey of the course in 1916: we should still be below par for stocks and production rates suited to 1941.

2. Point of View

My remarks from here on, as organized and phrased, may seem to imply a conclusion that the United States will shortly become a *de jure* as well as a *de facto* belligerent and that we will play a

major and decisive role by force of arms. No such view is adopted as a conclusion. Such a military role is only one of many possibilities. But this possibility exists and is increaing in likelihood: were it to become a fact it would be of overpowering importance and would require us to rise to our maximum effort in the shortest possible time. Hence failure to plan without keeping it constantly in mind would be inexcusably negligent.

Study of the actual proposal, however, will disclose that, in form and content, it is also appropriate to other endings of the war situation. An early military victory of Britain would still leave us with an enormous feeding job if revolution on the European continent is to be avoided as a sequel to war. The occurrence of such a revolution could be as adverse to us—witness the Russian and Italian revolutions in the wake of the World War—as a defeat of Britain. An early conclusion by a victory for Germany, on the other hand, would confront us at best with an armament race for many years—this, to put us in a position to enforce respect for our interests in our own hemisphere or even in our own continent. Such a conclusion of the war would also require us to maximize the efficiency of agriculture as a source of food.

For the next two years at least, the whole range of possible turns of events in the war requires a stepping up of our rates of production and consumption of meats, dairy products, poultry products, fruits and vegetables by contrast with staple cereal foods and sugar. The differences, as among possible results merely require differences of extent and proportion of effort rather than of kind and direction of effort. In any case, however, dominant consideration should be given, in a war situation, to the contingency of extreme effort even though the likelihood of its occurrence is relatively small. This is because the human and institutional cost of being wrong is so much more horrible if extreme war effort comes without preparation for it than it is if preparation is made for a contingency worse than the one that comes to pass.

By the end of 1941 it is estimated that twenty-five per cent of our national effort will be utilized in defense effort. That should be regarded as only the first twenty-five per cent—as the part certain to be projected into 1942. We must not preclude expansion. We must not allow 1942 to come without agricultural plans ready for and big enough for any hurdle we may have to jump.

For emphasis I repeat: we must not allow 1942 to come without

agricultural *plans* ready for the biggest hurdle we may have to jump. It is too late to jump much higher in 1941 but we must warm up and get on the mark and get set before the pistol is fired in 1942.

3. *Major Theses*

With respect to plans for 1942–1943 I want to present for your consideration six theses. Please do not regard them as conclusions to be accepted or rejected but as theses to be investigated. For the moment, I am less concerned with my own views than I am that you should formulate your own and put them promptly at the disposal of our responsible representatives.

My six major theses are:

1. To be adequate for the contingencies we now face, the central object of food plans must be freedom to use foods of each category at will—

   a. For current civilian maintenance;
   b. For aid to allies at their need;
   c. For diplomatic threat;
   d. For propaganda promise;
   e. For peace table bargaining power; and
   f. For post-war contingencies.

2. To assure freedom to use foods at will, the central means must be the provision of abundant and balanced reserve stocks, because—

   a. In time of war food use rates (withdrawals from stocks) can and do change hugely with the tides of wars and without notice at any season; whereas,
   b. Production rates to replenish stocks are biologically bound by seasons and by life cycles of plants and animals; and,
   c. Only stock piles can keep cyclical production ahead of episodic use.

3. To assure the necessary concert of effort the food plans must have an essentially simple structure. The bones must be big enough to bear, and the muscles be strong enough to move, the weight of war loads. To this end it is necessary to enlist the two most powerful motives common to all Americans—

   a. Militant patriotism in defense of their country and their civilization; and
   b. Self-interest in maintaining their present and future health, vigor and efficiency.

4. To maximize the useful result of our effort the plans must so use the powers of our national (or political) economy as to insure a tandem pull (rather than an offset pull) by—

a. Our exchange economy (agriculture and the food trades);
b. Our household (or consumption) economy; and
c. Our military economy.

5. To win a war it is necessary but not sufficient to conquer the enemy in the field: pacification, acquiescence, and change of heart are also necessary. The sharing of food is the primeval Golden Rule. If we have the wit and the courage and the humanity we can win this war rather than forfeit victory as we did last time.

6. To assure success the Department of Agriculture must regain its leadership; for the Department has the only trained teams necessary to manage the public administration. To regain leadership it must—

a. Formulate and announce its plan quickly; and
b. Enlist political collaboration of electoral groups big enough to assure continuity of its leadership "for duration."

PART II—*Notes and Proposals*

Before proceeding to make proposals let me comment at large on the theses.

War Magnitudes and War Dynamics

The most important general characteristics of war economics are:

1. Nearly all nations expect to win their wars; and wars are always harder to win than the winners expect.

2. All war plans turn out to be more less defective in one respect: too little advance provision is made in most major supply categories. Hence prudent preparation should consist of all the preparation that can be made.

3. Once battle is joined, all wars enter into, and remain in, a state of unpredictable flux.[1] Only reserve stocks confer freedom to change use rates.

4. Wars have to be fought at top speed. Hence deficient preparation can seldom be repaired; it can only be prevented.

With particular reference to food, the great lessons of prolonged wars are:

[1] This was written three days before the Russo-German war began.

1. All belligerents run short of one or more major categories of foods.

2. Food deficiencies, and their attendant increases in illnesses, kill more people than bullets do.

3. Preventable illnesses, and low vitality and stamina slow down war effort far more than any other cause. Indeed, these arise largely from scarcity of foods and the mal-distribution attendant upon high prices and fears of high prices.

4. In modern total war, efficiency in all civilian work has become as important as efficiency in the armed forces. The fine nutritional level set by the army diet is equally necessary for civilians.

5. Because we know the importance of foods and can raise them, it would be accounted shameful want of moral courage to be remiss in prudential preparation.

Agricultural Dynamics

Agriculture also is subject to dynamic limitations:

1. Even full effort to increase production of food is constrained by seasons and by the life cycles of plant and animal growth;

2. Because of reservation for breeding and of feeding to fuller weights, attempts to increase production quickly always slow down current supply rates for a considerable time;

3. Attempts to increase production rates up to the limits of unused capacity are much easier than attempts to increase capacity.

The Two Dynamic Systems

The food supply is caught between the two dynamic systems of war and of agriculture. A war can start or change for the worse at any season in any climate. A start or a change in May, 1942, would make us wait over a year for a major change in food production to be harvested. Only by raising reservable war stocks can such a catastrophe be avoided.

In the the *protective foods* we have never applied *even the principle of the ever normal granary!* Our production rates are far below capacity in most items. To be safe we should have to create, in the shortest possible time, stocks much greater than the peace time standards of an ever normal granary call for. Hence it would be a blunder to sacrifice early, though expensive, increase of production for later, but cheaper, increase. In war there is no rule against hitting an adversary who is down: no one is "saved by the bell."

Calculus of war risks. In every case the inevitable consequential damage from having too little is vastly greater than the necessary consequential damage of having more than is necessary to security and to market stability. The latter need never run beyond the level of a money loss appropriately to be borne by the whole public. The former takes its toll in many ways: in market disruption (e.g., rising prices that necessitate wage increases); in money costs (e.g., the smaller stock may, via windfall profits, cost more to users than it would have cost to raise and distribute a larger stock); and, most important of all, in human damage in loss of morale, in nutritional deficiency, in battle casualties, in wars lost.

The economic moral of these dynamic systems and of the character of war food risks is plain: errors on the side of abundance are not only highly unlikely to occur at all but, even if they do happen, they are not of critical importance. Errors on the side of deficiency are more deadly in their consequences, are more likely to occur, and can be minimized only by informed early planning and resolute carrying out well ahead of current use requirements. There is no remedy for shortage: there is a preventive. This moral is the more important *for us now*, because we do have idle land, men and equipment suited to accumulating foods; and these resources cannot, for the next two years, be drawn into the munition making and military effort.

Technological Means

Quantity budgets. To get the most prompt and fullest use of our producing capacity appropriately distributed, it is important to formulate quantity budgets, or time-tables, of the production wanted. For this operation the following principles are suggested for consideration:

1. Set up aggregates for successive years of the principal categories (meats, dairy products, poultry products, vegetable protein foods, fruits, vegetables) in the desired proportions so far as capacity for such aggregates and proportions may appear to be available.

2. Within each category thus estimated make a farm commodity breakdown that takes account of:

   a. Present and recent production rates;

   b. Ease of substitution of one commodity for another within the category;

c. Relative speed with which production rates and early deliveries can be made;
d. Alternative end products (e.g., current use fresh, preservation for military reserves, forms suited to shipment to Britain, etc.) of the several farm commodities within the category; and
e. Fullest use of underlying crop production (e.g., range, forage and fodder, feed grains).

3. Give precedence to those categories most likely to be subject to great demand increase on short notice (e.g., increases in shipments to Britain, war supplies).

4. Give precedence to those crops within the category that promise the quickest big results.

5. Give precedence to regions in which cumulative trends and the impacts of war have caused greatest need for adjustment of regional production.

In both the category and commodity budgets, special regard should be given to the consumption rate of foods usual to the income band in which the preponderance of defense employees are embraced—say $1200–$2500 per year. As defense production picks up the new employees nearly all come from a *lower income band.* Hence *the rates of change* (from the lower to the higher band) in consumption rates in this income region have a high predicting value for quantities needed. Dr. Stiebeling's studies, pieced out by the Stamp Plan experience show a powerful urge to better the diet at this income region.

Close attention should also be paid to the army diet make-up. In animal proteins, fruits and vegetables this runs far above national per capita levels. A possible doubling of the army strength would, itself, require a large allowance.

The production rates for meats per capita in 1917–1918 were the highest in our history. Yet we required "meatless days" in the latter year, despite the fact that we bought beef for the expeditionary force in huge quantities from Argentina and elsewhere.

Commodity programs. Diversity of location of producing areas, character of growth, and variety of processing and end products require multiple production programs both at farm and subsequent levels. This does not necessarily mean separate programs for each crop: groups that are economically similar (e.g., stone fruits other than prunes) can be managed alike save for unit prices. In setting

up these programs the following principles, in addition to those referring to the food categories, are suggested for consideration:

1. The quantity wanted (and the inducement to deliver it) should, in the estimates, be set high enough to assure that the quantity actually produced will be limited by running against the capacity barrier rather than be limited by setting the estimate and the inducement so low that some standby capacity goes unused. The resultant increase in income to farmers is well merited—the more so because the added income is addressed to a useful end.

2. Variety of end-product forms, containers, etc., and the draft of these on package materials, specialized storage space—and the utilization of small storage reservoirs such as basements, vacant buildings, etc.—should be taken into account.

3. Direct dealing by the administrator should be allowed at any stage in order that it can be used at the stage at which a minimum number of persons must be dealt with;

4. Existing personnel (e.g., county committees) should be utilized; and

5. New programs should, so far as possible, supplant or modify existing programs rather than be added to them.

Underwriting the Food Budget

We would be beaten before we start if we were to rely exclusively on the aggregate of private initiative either to establish an adequate production time-table or to assume the risk of adequate compensation for producing each item in a quantity budget set up on paper in Washington. This is as much a national defense matter as airplanes are: indeed, we would not even get all the planes we need nor could we use them well unless we feed well all those engaged in the national effort. In total war and total defense it is the total population that are the work animals and that must be efficiently fed. With a man, just as with a horse, it is not enough to fill his belly: it is necessary to make him arch his neck if a big day's work every day is needed.

The total budget and each item in it must be underwritten by our joint taxing and borrowing power. "Business as usual" will not do the job—not because people are mean or greedy or cowardly or because our system of private enterprise is faulty but because the several million farmers who must start the producing sequence can not do it alone whatever their goodwill. They can not individually:

1. Make estimates of the total quantities wanted; or
2. Estimate the compensation that would accrue in prices to become available; or
3. Afford to be wrong in overestimates of compensation.

For like reasons, neither processors nor warehousemen nor dealers at any level can or will take the risk of making advance commitments to growers at levels high enough to guarantee the result needed.

But the technical staff of the Department of Agriculture can make the kind of national quantity estimates needed. They can also estimate the unit compensations necessary to elicit the responses. The administrative officers can lay out operational procedures suited to making the programs work. These are the kinds of things the Department staff can do better than they can do anything else. They can do these things better than any other crew in the world can do them. This is their chance to prove to their country that they are a good national investment.

If we jointly underwrite the whole job by setting minimum guaranteed unit compensation to growers and permit adequate handling margins at successive levels then our exchange economy will work—and at top speed. This is only the common business principle of forward ordering in order to be sure of deliveries on time. With such ordering each farmer can and will:

1. Form a judgment of the quantities he could produce on his farm;
2. Multiply the guaranteed unit payments into his quantity estimates;
3. Make a good estimate of the crop combinations that would pay him best; and
4. Lay out, finance, and carry through his job.

Thus underwritten with respect to spreads between successive stages of manufacture our whole enterprise or exchange economy can pull together—each man at his own load and in his own interest; and all in the same direction in the common interest. Instead of decrying self-interest or the profit motive we should give it a chance to do its work most usefully, and we should reward it generously. We should be thankful that we have so simple and so powerful and so widespread and so easily enlisted a force as self-interest to rely on.

The reason for putting the payment risk on the strong shoulders is that the whole public as a nation can bear the cost of abundant production far easier than they can bear the consequences of scarcity: but farmers, as individual operators, can bear the risk of scarcity far easier than they can bear the risk of abundance coupled with low prices. Since the whole public must, in the end, bear the consequences of all risks taken (or attempted to be evaded) by individuals it makes best sense to have the public assume the price risk in the beginning. Just as a business man sure of his need for materials, but fearful of shortage of them, orders in advance, so should a nation order in advance.

The Distribution Problem

To get the fullest benefit of the stepped-up production a balance among four distribution objectives must be provided for and maintained. These four distribution objectives are:

1. Building up of military stores;
2. Shipping to allies (allowing for their under-estimates);
3. Accumulating post-war reserves; and
4. Bringing the national diet up to par of efficiency and maintaining it at that level.

To bring out the necessary production responses and to satisfy the first three distribution objectives it would be sufficient to guarantee minimum prices to growers (say in terms of terminal market prices) and to maintain prices at those levels by open market operations of the Federal Government. But the fourth distribution objective, feeding all our civilian population well, would be frustrated if we load those foods with prices high enough to bring out the requisite production response quickly enough.

But that "if" can be licked. It is not necessary to load total costs on unit prices. Growers can be authorized to grow as much as they will of the budgeted commodities and sell them at whatever prices prevail in the market in which they operate. At the end of the season, on proof of sale verified by the county committee the Government can make up any price difference adverse to the grower. Non-recourse loans at the minimum rates can be authorized. Direct purchases by the Government at any level can be provided for.

Once food products are in the channels to trade the successive spreads can and do adjust themselves to any starting price.

By means of differential bonuses the protective foods can be made plentiful and cheap by contrast with the retail prices of the crude cereal staples. Thus the incentives operating on housewives to feed their families well can be freed to do their work. This would permit harmonizing all four distribution objectives with the production objective.

By such means we can harness our four great economies in tandem: the national or political economy to assume the risk and to pay for part of the producing effort by use of the taxing power; the exchange economy to do the growing, manufacturing, and handling; the household economy to pay for the rest of the cost and do the feeding; our military economy to do the fighting with least sacrifice necessary to victory. Given adequate discretionary authority to the administrator, both the food price level and the relative prices of foods could thus be controlled by two types of financial operation:

1. Setting minimum guaranteed unit returns to farmers; and
2. Buying for and selling from stocks.

These powerful and simple means, for which most of the machinery now exists, could assure adequate feeding (or real opportunity for it) to all except those who become public charges; and these, being capable of mass certification, can be cared for as now by the Stamp Plan and kindred programs.

A proposal so to subsidize the production of the protective foods as to allow them to become relatively much cheaper at retail than they are now (by contrast with the cruder cereal foods and sugar) would bring strong political allies to the support of farm programs. Nutritionists, public health men, physicians and army and navy spokesmen concerned over the high rejection rates for nutritional deficiencies would help. Labor unions, consumers' cooperatives, the League of Women Voters, etc. suggest numerous organized voter blocs whose help could be enlisted. Housewives—especially in low and middle income groups—would be interested.

Once a beginning of this kind were made there would be an anchor for our agricultural policy in a voting majority of the electorate. It is not necessary to comment on the repercussion of such an anchorage on the present dominance of particular organizations representing the present few political crops.

In his address to the Triple-A conference on June 10, Mr. Appleby, Undersecretary of Agriculture, spoke of the need for a

"dynamic factor" to reconcile the power to produce in abundance with the need of better food for all. The form of subsidy proposed above was designed to serve that end. Whether or not this is a good way there must be no let-up in the quest for the "dynamic factor" of which Mr. Appleby spoke.

Novelty of Proposal

The proposal is novel only in its subject matter of application. We have had more or less of it in other parts of our economy throughout our history. For the Army and Navy we make physical budgets of uniforms, equipment, machines and weapons and we underwrite the entire cost before production starts. No one makes any of these things in the hope of selling them after they are made.

In our peace time economy we underwrite publicly a huge proportion of all the costs of all automotive transportation by building hard surface roads for free use. Part of the cost of this service we leave to private enterprise—that of building, supplying and maintaining cars. This gives, in this field, the same kind of division proposed above: part we pay by volition as taxpayers, part we pay by volition as buyers and users. There can be no doubt that, in transportation, this works far better, especially in the interests of automobile manufacturers, than would a wholly private enterprise system—say by use of toll roads on which everyone would have to pay as he went. Certainly this "dynamic factor" works wonders in our automotive economy.

Our public land disposal policy was, for many decades, a subsidy of food production in its inevitable effects. But, novel or not, national defense programs and war cannot be won by arguments over novelties in systems of economics. There must be some system simple enough to be operated and powerful enough for the job. There is not time to devise a perfect system. We must make it possible for our present system to do its best work.

The Department's Position and Prospects

At the beginning of this Congress the Department of Agriculture had no unified program to offer—much less one that was timely and adequate to the defense situation and war prospects.

If the general public becomes aware of the dangerous current supply and reserve stock situation before the Department of Agriculture comes forward with adequate proposals it will be extremely

difficult if not impossible for the Department to regain its leadership. A major adverse turn of the war could, within a few months, make shortages, or fear of shortages, so acute that national rationing and direct retail price control would be upon us. In that dreadful event the Department may become thwarted by some new agency—may become another ninety-six inch tail on a four inch dog.

To preclude such a disaster (it would be no less) the Department of Agriculture should forthwith set its best men to work to devise a really adequate total program.[2] Those men who have not yet seen the necessity for contingent reserves are not the best men for this job. This is said without disrespect for rank or past performance at other tasks in other circumstances. But to try to persuade men who cannot yet see the size and shape and direction of this world civil war would be a waste of time. What and how big the reserves should be, are arguable, but not whether there should be any.

Whatever program the Department of Agriculture does prepare should be prepared exclusively for its fitness for the situation. All too often—even to friendly observers—the Department's proposals have seemed to be based on little more than someone's vague hunch as to what was politically feasible. To be sure, these presentiments are often rationalized into intricate arguments that profess to find merit in the proposals themselves. But this kind of casuistry, however fascinating to a legislative technician in peace time, is unbecoming to a statesman in a time of national danger.

RECEIVED JULY 30, 1941

[2] After this speech was written Secretary Wickard set just this task. Over two hundred of his ablest staff formulated the "Production Goals for 1942." The ensuing public acclaim shows a recapture of leadership. By achieving those "Goals" that are adequate and surpassing those that are not the leadership can be held.

FUNDAMENTAL ELEMENTS IN THE CURRENT AGRICULTURAL SITUATION*

JOHN D. BLACK
Harvard University

THE DAY and the hour seem to call for analysis in terms of broad fundamentals. This is no occasion for the refinements of theory and their application; but rather for over-simplification and over-emphasis on a few vital elements. Something of accuracy is lost in consequence; but this is not relatively important in the emergency that confronts us. There are wild horses loose in the world and the first task is to bring them to leash. Later we can break them to the plow and the cart.

It will be startling for some of you to note as I proceed that much of this statement of the fundamental elements in the situation is largely a new formulation; that is, neither I nor any of my fellow economists would have made it in this way ten years ago. This year I have had a student at Harvard who was with me nine years ago. He is facing the task of getting ready for his general examinations in theory, money and banking and the like, for the doctorate. He came to me at the end of the first month with deep wrinkles over his forehead. "Tell me," he said, "what is wrong with me in my theory. Have I forgotten everything that I learned nine years ago? Or is what I am getting now something different? Anyway, I don't seem to recognize much of it."

I had to tell him that the latter explanation was more nearly the right one. John Maynard Keynes had not yet really come within our ken nine years ago. And the competition theories of Joan Robinson and Edward Chamberlin were just beginning to be discussed.

The theories advanced by these recent economists are of course not wholly, or even largely, new. Keynes pieced his system of thought together out of the thinking of numerous progenitors and contemporaries. Very little of what Robinson and Chamberlin wrote was not to be found somewhere in the economic pigeonholes of the minds of their contemporaries. But the ideas which they assembled and welded together had not been receiving much attention before. The important thing is that they built these into new systems of thought and new explanations of current phenomena.

---

* Address at evening meeting of the Western Farm Economics Association, June 26, 1941.

Furthermore, it is highly important to recognize that this new orientation essentially came out of the post-war environment, and not out of the minds of these economists. If, perchance, any one of them had written the same things earlier, he would have received scant attention. His fellow economists would not have sensed their significance.

As it is, I expect that many in this room have not sensed them halfway even yet. They are still thinking in terms of the system of economics written in such textbooks as Ely's "Outlines," and Moulton's "Financial Organization." The new editions of these books—even the newest edition of Fairchild, Furniss and Buck—almost wholly fail to include the new orientations.

The post-war world needed a new kind of economics. The old kind was not suited to it. This does not mean that the economics in the old textbooks was largely wrong, or even that it does not still have important applications. It does mean, however, that the economic and political world has so changed that some parts of the old system of economic thought have become more or less obsolete, at least for the time being, and other parts in turn much more pertinent and applicable than before. These parts have needed to be brought forth into the full light, examined, expanded and reformulated. The reformulation has added considerable that is new, and that is important at this time.

The economics of the pre-war era assumed a world functioning, or about to function, in terms of an automatically adjusting international gold standard and balance of payments. The textbooks, in fact, wrote of such a system as if actually in operation. They rarely even hinted that sterling exchange was in appreciable measure a managed exchange. No doubt, however, the system was near enough to automatically working so that the textbook assumption was reasonably safe so far as the United States and Europe were concerned. In the post-war years, in contrast, so large a part of the world has been deliberately manipulating its internal price structure and foreign exchange that the rest of it has been forced sooner or later to follow suit in self-defense. These manipulations have in turn been geared in with national fiscal policies designed to provide more employment, and guide and direct internal economic activity. A largely new system of monetary and fiscal theory has been called for and it has been provided.[1]

[1] An excellent formulation will be found in Alvin Hansen's Fiscal policy and business cycles, W. W. Norton and Company, 1941.

Still more significant, the pre-war world assumed an economy of full employment, of an expanding volume of economic activity and consumption that would give nearly everybody a job who wanted one. It was realized that periods of economic recession were recurring when men were thrown out of work; but we chose to regard these as sick leaves. The post-war period has brought us an understanding of these as the usual condition of our present so-called capitalistic economic system, and that only in very temporary periods of wild financiering and promotion will we have something approaching full employment. Now this was really implicit in our economic order of the pre-war years; but it was so overlaid by the stimulating effects of a still rapidly expanding population and exploitation of natural resources that it was largely concealed. Now it begins to stand forth in its full meaning. Since the World War the prevailing condition in this country has been one of true unemployment of around five million of workers. This will continue to be the usual situation unless we change the functioning of our present economy.

To understand the functioning of this economy, we need an economics of unemployment of men and of resources and of plant and equipment. Some writers have said what we need is to shift to an economics of abundance and plenty rather than one of scarcity. This is altogether the wrong way of putting it. We have very far from enough of a long list of goods to satisfy really important needs of our own people, to say nothing of the peoples in other lands. I need only refer to the need for better rural housing to make my point clear.

Another point that must be forced in on our consciousness as professional economists is that we have not finished our task when we have provided an explanation of continuing unemployment in the midst of great and continuing needs. We must also include in our system of economic thought a clear statement as to how to convert such an economy into one of full employment of men and resources. We must furnish the world of men and affairs with a chart showing the steps to be taken.

Probably it is unreasonable to expect all economists to contribute to this second part of the assignment. Some of them are constitutionally unfitted for the second part. Their minds really refuse to function upon it. They may try hard to conceive of good forward steps to take; but in the end find themselves acting mainly as

critics of proposals offered by others, and almost invariably concluding that they will not work. But somewhere in our group there must be "working economists" who can tell us what we must do from here on to get where we need to be, and do it realistically in terms of people and groups and institutions and organizations as they are.

The most important single idea that has evolved out of the thinking of economists since the World War is that our so-called competitive system does not generally work in such a way as to lower prices of products with lowering cost and labor inputs and thus in such a way as to enable consumers to buy the increasing volume of output that should naturally result. There are two general situations in which this is true. The first is the lowering of costs and labor inputs with improvements in technology, either of the secular or of the innovation type. These may affect only single products here and there, but there is a tendency for them to be grouped in certain periods of general innovation.

The second situation is that arising from the general lowering of unit costs with increasing output in periods of general recovery from a depression or recession. I need not tell you that unit costs of industrial products, of transportation, of distribution, and of many services, decline greatly at such periods. In practice, prices are more likely to rise than to fall at such times. Just as they are doing now! Who has yet heard of a manufacturer bidding on a government defense contract who has said: Now that my volume of output is being increased, I can make you this remarkably low bid of so and so? The rise in prices was so rapid in 1935 and 1936 that it helped greatly in killing off prematurely the business recovery of those years and giving us the tailspin of 1937. Business as a whole seems to reason: For several years now, profits have been low or non-existent. This will have to be the time for making up for these lean years. What business as a whole must do instead is to say: We seem to have a little pickup in volume of sales; let's do our best to nurse it along and expand it. The more we can sell, the more men we can employ, and the more general buying power there will be.

The major difficulty with such a procedure, of course, is that no one manufacturer of a product can ordinarily afford to do this, in either the short run or long run, unless his competitors will also. Not only his immediate competitors may be involved, but also the manufacturers of supplementary goods. Thus the lumber manufac-

turers are able to point out truly that keeping the prices of their product down or lowering them will not stimulate enough new building to give them higher earnings *unless* the prices of steel, plumbing, cement, paint, roofing, and above all, the prices of labor are also kept down or reduced. The steel industry takes a similar position, and rightly so.

The Brookings Institution has been doing much writing and talking of late years that seems in part to disagree with what I have just said. Dr. Moulton has been exhorting business leaders to keep the prices down so as to promote recovery. So far very good. But then he has gone on to say that in the long run it will pay them to do so —each of them individually is the implication.

Nourse and Drury of the same institution wrote a book showing that a few firms or small groups of firms had made money by following such a program over the years. The ones they selected were pioneering industries in which at the time these firms led the way and supplied most of the product—automobiles and tires, for example. I need not tell you this situation no longer prevails in the automobile field nor in any but a very few others. Aluminum could now be a case such as automobiles once were.[2] The general effect of the NRA episode seems to have been to make conditions worse in this respect. Mr. Thurman Arnold will be able to discourage certain overt kinds of conspiracy to hold prices in line, but in the main our business men will merely learn from him that these overt activities are not needed, that price leadership and other forms of monopolistic competitions will obtain the ends they seek without getting them into the toils of any law at least now on the statute books.

Agriculture, it was recognized long before, operates mainly according to a different set of dynamics. The late Henry L. Moore of Columbia University really had discovered this in part, although he failed to see the import of his findings, when he concluded that the demand for farm products has a downward sloping curve, such as asseverated in the textbooks for all products, whereas that for steel and similar products seems to have an upward sloping curve. He was, you will remember, dealing with historical series, and what he concluded was in fact an historical summary of the respective orders of price-volume events in industry and in agriculture. In the case of industry, higher volume of production and prices had usually come together; in the case of agriculture more often the

[2] It more nearly is than most realize.

reverse of this. Although agriculture as a form of production is supposed to be affected by increasing costs, historically the arts of agricultural production, and the exploitation of new agricultural resources, have proceeded so rapidly as to give us lower prices with increasing output most of the time since the 1880's. The major exception to this general trend was a stretch of 15 years beginning about 1896 when prices of farm products were indeed rising faster than those of industrial products. But a counter development was already under way by 1910–12, and would have given us relatively low prices for farm products from 1920 on even if there has been no World War.[3] I think this statement is consistent with Dr. Canning's analysis, but I am not sure.

The second line of thinking that has contributed new understanding of recent economic history relates to the manner in which investment in capital goods, housing, and durable consumer goods has expanded and receded in the past, and has been at a low ebb since the end of the housing and automobile boom in the decade of the 20's. Too many of us formerly were thinking of the ebb and flow of economic activity in terms of prices, failing to recognize that this only in minor degree was in the causal role.

Thirdly, the economists of the nation have had to adjust their sights in order even to recognize the phenomenal doubling in real wages of urban workers that came with the war and its aftermath—to say nothing of realizing the impact of such a revolution upon the national economy, and especially upon agriculture.

As many of you in this room know, I have never been willing to accept the relationship between food prices and urban wages in 1910–14 (the so-called "parity" years) as being a reasonable guide to policy and program. My judgment is that urban wages were unconscionably low in these years and needed to rise. But the rise that followed came altogether too suddenly for agriculture to absorb without grave losses. If the same amount of wage increase had spread itself over 20 years in place of two or three, agriculture could have adjusted itself to it in large measure.

It is rather futile to discuss the question as to whether or not urban wages are too high now. They surely are relative to agricul-

[3] In the shorter run of the so-called business cycle, it is true that prices of farm products have risen with general recovery; but it would be difficult to show any characteristic co-occurrence of rising volume and prices such as is usually found in industry. Instances of such are usually associated with wars and the like. Neither Moore's nor the National Bureau studies find such a relationship.

tural incomes. They may also have been too high in the sense of stimulating industrialists to substitute power and machinery for labor and thus prolonging unemployment. The major point in this set of relationships to keep in mind is that the higher wages have been paid out of the prices of industrial products that failed to come down as needed in order to expand volume and consumption. If we could know that lower wages really would have meant correspondingly lower prices, and fuller employment in consequence, then the answer would be easy. I find myself doubting that this would have occurred in our capitalistic system as now functioning. Instead we are increasingly experiencing what is in effect a sort of conspiracy between employer and employee groups, the net effect of which is the paying of higher wages and the passing of these on to the consumers in higher prices, this aiding still further to prolong unemployment. Employers are finding it easier to "stick the consumer" than to fight their employees. Few of them have adopted the procedure which would be more rational if generally followed, that of lowering their prices so that there would be smaller immediate net earnings to fight over.

Mal-distribution of real income, of course, figures in an important way in the total situation. The largest factor in this has already been introduced—the unemployment of the wholly or partly employed. But even given full employment, the earnings of many families in this country would not afford an acceptable content of living. In the rural areas, partial unemployment takes the form mainly of not having enough land and equipment to work with effectively.

The general formulation to take care of this phase of the situation runs like this: There are some men and women congenitally so feeble in mind and body and moral energy that they could not now be producing the means for a minimum standard of adequate living even if they had been given an equal chance with others at health, education and a job. The great majority of them, however, would now be providing for themselves if they had been given the equal chance described. Until our economic system operates in such a way as to afford our people this equal chance, our political system is highly unsafe. Our republic was founded by a people who were much concerned over civil and political rights. They fought for these against their mother country. They wrote them into the "bill of rights" in our Constitution. Given these rights, they felt fully able to look out

for themselves. There were new areas of land to turn to, new shops that could be opened, if they did not like their present jobs. This is no longer true. For ten million or more of them, the job is working as one of many for a large employer. These millions have become more interested in this job than anything in the world. This interest necessarily extends to the industry and to the particular plant in which they are employed. They want to have something important to say about how this plant is run. They are more concerned over this than were ever our forefathers about "taxation without representation."

What is still more important, they have learned out of the experience of the last several decades, but particularly out of that since 1933, that they can use their ballots to protect their interests in their jobs. They can support political parties and candidates that give them protecting laws and sympathetic administration of the same. They can also support labor organizations that wield much power in Congress and in state legislatures, as well as in collective bargaining with employers.

So firmly convinced are these millions of workers of the possibilities of using their political power, and their right to organize, in these several ways, that nothing short of some sort of political coup, or a war or its equivalent, can change the situation.

Given this new power, how is labor going to use it? Not wisely, on the whole, in the near future, I think we can expect. Programs will tend to be short-sighted, in the interests of entrenched labor and not all labor, and often not in the national interest. There will be much over-emphasis on wages at the expense of employment. In time, labor leadership will become much wiser. But will it become wise soon enough, that is the question.

It was with the passage of the Agricultural Marketing Act in 1929 that agriculture got its first real taste of blood. That act put up a fund of $500,000,000 to be used to sustain prices and underwrite farmers' cooperatives. The Agricultural Adjustment Act has distributed funds more generously and generally and even more directly. Each succeeding revision of the Adjustment Act has taken more nearly the form of distributing federal funds between different commodity groups. There are, of course, some other important elements in the AAA program; but the great bulk of farmers receiving payments look upon them as their share in a total sum of money being handed out to farmers because prices of farm products are too

low relative to wages and profits. The distribution of this bonus is taking on increasingly the character of the old battles over tariff duties. The hands of the contestants in the present session of Congress must surely smell of strong pork. Just as the labor leaders over-emphasize wages, so they over-emphasize prices. They are equally short-sighted and opportunistic. Will they too become wise soon enough to avert calamity for themselves and the nation?

Nevertheless one has difficulty in thinking harshly of the roles now taken by either labor or agriculture. In making use of political power as an instrument of crude economic advantage, labor and agriculture are only following a pattern set by industry and trade and finance very early in our national history, and still followed by them intently. It is fairly safe to say that these interests largely dominated our public policy most of the time until very recently. The early battles were over the tariff duties and special privileges to exploit our national resources. So venal had the business of writing a tariff act become by 1920 that the Congress had become totally unable to write such an act in the public interest. A pure accident of political history set up the present trade agreement procedure to take the place of the old system which had failed. Wise administration of the Act has saved it for us up to this time. For how much longer, I would hesitate to predict. The labor and agricultural lobbies in Washington may be potent; but their efforts look a bit pale at times when set in comparison with those of groups that have been looking after the interests of the national manufacturers, the public utilities, the sugar refiners, the chain-store antagonists and protagonists and the like.

Go out into the state arena and one readily thinks of whole administrations or departments of government now or recently in the saddle because of support from strong private interest groups—power groups, mineral resource groups, and trade groups.

The farm organization group seems to have reverted back to the position of the Equity group in the early 1900's, as stated in J. A. Everett's book, "The Third Power." Capital was then looked upon as organized, and labor as organized. Agriculture needed to organize as the third power. The main difference is that Everett looked to agriculture to win its battles in the market place, whereas the present organization group is looking to Congress and the state legislatures.

This setup immediately raises the question as to whether a "ne-

gotiation" process between these three powers will provide a safe and workable national and local public program—whether the outcome of their higgling in the market place, and trading favors in legislative halls, will be programs and procedures and price policies that will reasonably well serve the general body politic.

A considerable school of thinkers in the field of political science now take the position that the so-called "public interest" is a myth; that in effect such an interest can consist only of what comes out of some sort of a negotiation between the power groups. I have never been willing to accept this position fully, but have insisted that unless there is weighed into the balance, along with the selfish interests of the several power groups, a considerable measure of thought in terms of the general good, then popular government will fail, and presently go to ruin—as it has done recently in much of Europe.

Or if the theory of negotiation between power groups is sound and workable, then surely a fourth power group must be included, which for the want of a better term is commonly called the consumer interest. Otherwise the three other powers will generally come out of their negotiations with higher prices for the producers, higher margins for the dealers and processors, and higher wages for the laborers. This might be all right if the particular groups of producers and dealers and workers were the sole consumers of the product. Actually they pass on the higher prices to a much larger body of consumers, most of whom are in no position to recoup their losses, and whose buying power is reduced to the injury of all.

The process is well illustrated in the milk markets of today. Where the government has been made the fourth party in milk market agreements, it commonly proves to be a tool or cat's paw of one or more of the three powers. In the New York market this last winter, however, we had an example of the federal government really acting, for a time at least, as a fourth power in behalf of a broader public viewpoint.

Much of the time since the marketing agreement and order program was set up in 1933, the federal and state government agencies have been too much dependent on political support in Congress, or upon administrative support in local markets, to be free to represent the general interest. Nevertheless, these marketing agreements in which some government agency is made more than arbiter, is made an actual fourth power, able if need be to exercise the deciding vote in matters of volume of output and prices, must in my

judgment serve as one of the patterns for future developments. Such a setup has considerable in common with the old N.R.A. type of industry organization—the so-called code authority. But its objective and lines of action must be vastly different. It must make the maintenance, and expansion if need be, of volume of output and sales, and accompanying full employment of workers, its almost sole guide to conduct. Obviously one cannot establish such code authorities by mass creation as Hugh Johnson attempted it. But a half dozen major industries could be set going in six months.

In this connection, I call your attention to the fact that Mr. Knudsen of OPM has organized his program by industry committees. OPM played around with other procedures for several months without anything like satisfactory results. The change to the new type of organization evolved out of this experience. The objects of such organizations during defense and war are clear enough—they must get a large increase in output at minimum increase in prices.

These same industry organizations, and as many more as needed, should be carried over into the post-war or defense period. No doubt they will need revising somewhat at that stage. Their objective in those years must be to keep up the volume of production, sales and consumption in all those industries that are producing goods needed in peace-time, and in the others to shift the output to peace-time types of products as promptly as possible. The general guiding principle for such industry organizations is clear enough: They must establish and maintain such a relationship between prices and production of the various products, and wages and incomes of workers engaged in their production, as will result in approximately full and continuous employment of men, equipment and resources. They must not allow our capitalistic system to return to its old practice of holding up or raising prices as a means to higher, but merely temporary, profits for the individual firm or industry.

Here is the place where our new orientations in economic theory become the basis for actual working programs. Let the economists of this new day put themselves at work by industries and develop for them the production, price and wage programs that will attain the ends required.

I do not wish to be understood to say that the programs for the different industries need not be coordinated, that no economists need to be concerning themselves with the over-all aspect, and with inter-industry relations. But an internal analysis by industries is required as a basis for this latter.

The Keynesian type of theory also fits into this picture. In spite of the best that can be done in shifting production to peace-time lines of goods at the end of the war or defense preparation period, we will have temporary cessation of employment of considerable numbers. Something in the nature of public works will be required for a time. But we should keep this at a minimum by promoting the production and sale at low prices of goods that can be sold in the regular market. The financial power of the government should mainly be devoted to underwriting such production. It should by no means be wholly of direct and immediate consumption goods. There must be production of goods that will liquidate themselves over several years, and even over 20 to 40 years.

Taxation must play an important role in this, partly as a means of raising the funds required for this underwriting of the program. But more largely because a considerable part of the goods and services which an expanding economy wants are of kinds that we are now paying for out of public moneys—education, public health, parks, roads, and the like. Another part of the activity of these years may well be of types that will never liquidate themselves wholly in the direct sense. I have in mind as an example the rehabilitation of our forests and our eroded and denuded lands. We get our returns from such public investments through building up the tax base itself, or through general social betterment.

A still further need for tax funds comes from another source. The programs thus far outlined must be supplemented more fully than now by arrangements that provide much more nearly equal opportunities for all social groups and areas and individual families. At the New Orleans meeting of the Farm Economic Association, Professor T. W. Schultz emphasized a distinction between allocation of resources and of income, and strongly espoused the former. I would go along with him, provided the resources allocated take the form of education and training of the low-income youth, provision of better health facilities and better nutrition for this group, and provision of land or equipment for competent young men and women who do not inherit the means wherewith to acquire these. Given this, there would need to be allocation of income only in the main for the weak of mind and body and morals.

For these latter, there is continuing need for a well organized and scientifically conceived work program of the sort that the WPA is not now, but should be—a WPA wholly taken out of politics, that develops types of work suited to the individual and that can be

paid for on a going piece-work basis so that the workers will not suffer the degenerating effect of over-payment for their efforts. Of course, there will still be the need for supplemental direct public charity.

I see no difficulty in raising the tax funds required for the foregoing, provided we keep our economy going in the manner outlined. They will be far easier to obtain than what we are raising now from a crippled economy.

What is the immediate application of this to agriculture? First, the provision of full employment for urban workers, supplemented by adequate provision of food for proper nutrition of the low-income group, will give utilization for many of our idle and undeveloped acres in the production of the protective types of foods. Second, the maintenance of full employment in industry and expansion in due order, will provide livelihoods in urban or local non-agricultural pursuits for millions of excess population of our congested farm areas, and permit a shift toward more extensive forage and livestock forms of production. Third, the type of public work program outlined will furnish employment in forest and other land improvement activities in the interim period while the nation is making the transition from war-time to peace-time production and consumption.

If agriculture is to fit into all of this, it will need to have imposed upon its present manifold and complex system of state and federal agencies a type of over-all federal, state and county agricultural defense organization, of a nature somewhat suggested by the food administration of the last war, but more direct in its operations; and this organization will need to carry over into the post-defense period.

I shall conclude by some remarks that should lay a foundation for the forum discussion of tomorrow morning. The activities of the defense and/or war years will draw off much of the excess of workers now on farms. It will not cause all of the wide-scale shift of land to forest use, or combined forest and agricultural use, that is called for in many parts of the country, especially in the Appalachians. But it will make definite progress in that direction. I do not expect to see a sufficient realization of the program outlined above to take care of all of these workers in non-agricultural pursuits when the war years end. But I expect to see enough of it so that a large proportion of them will be provided with jobs, or at least will not re-

turn to farms. In the longer run, I do not look to see, like Dr. O. E. Baker, seven or eight million bona fide farmers because the cities do not provide jobs for them, but instead some three or four million of them. There will be, in addition, a larger number than now of residential farm families who do a little farming on the side, and of part-time farmers who fit together some farming with part employment in industry and trade. But the total will add up to less agricultural employment than now, the difference being made up by more machinery and power, and more labor-extensive systems of farming. Technological intensity, in the sense of fuller culture of the land, I expect to see increase; and of course total volume of agricultural output.

On the whole, I expect to see more production for home use in most parts of the country—in the South because under the cotton and tobacco economy as until recently practiced, a premium has been placed on not engaging in such production; in the Appalachians through improving the technology of such production; in many parts of the West, through making more available the water needed for it. But we must not confuse this trend toward more production for the family with the prospect for more and smaller farms. It is true that it contributes to the possibility of the latter; but it will not produce it except in limited areas and temporarily.

My final remark is that even though we stagger out of the present defense preparation years into a heavy recession, recover from it haltingly as after 1920, and then pass into another decade or two of prolonged stagnation, we shall still see a general mechanization of farming, and painful absorption of displaced farm workers in cities. I did not think this six months ago. Since then I have spent my time mostly in interviews and observations in the regions where such a change will be most painful—in the cotton and tobacco South and in the Appalachians.

I need in self-protection to reiterate, in conclusion, that I fully realize that I have over-simplified the broad problems with which I have dealt; nevertheless, I believe it was called for on this occasion.

RECEIVED AUGUST 8, 1941

AN AGRICULTURAL POLICY FOR HEMISPHERE DEFENSE

FRANCIS A. LINVILLE
Department of State

"FOOD WILL win the war" we were told in 1917–18. But in 1939 when the next world conflict began, agricultural experts said that most farmers should produce less, that war would only intensify the farm surplus problem. There were excellent reasons for this view, but, nevertheless, in the summer of 1941 most United States farmers had become exceptionally optimistic about the future of farm prices. Demand had increased because of expanding industrial activity, increased British purchases and, above all, because of our government-aid policy of purchases and loans. The present farm outlook is the brightest for many years, but what will be the long-run effects of current international developments?

The European market for our farm products is undoubtedly going to be smaller after the present war than it was before. If Germany dominates most of the Continent and organizes it into a relatively self-sufficient unit, we shall lose the markets in which we sold about one-third of our farm exports before 1939. If Germany is defeated, sales to the impoverished Continent will still be small. If the British Isles come under Nazi domination, here alone we shall lose a market for approximately one-third of our farm exports. If Britain is victorious, still she will be unable for many years to purchase as many imports as in the past because of the war's ill effects on her production of export goods and the reduction, if not elimination, of her net income from international investments.

And the agricultural outlook is also affected by our adoption of a more active Pan American policy. In the past we have been little concerned about the welfare of farmers in the remainder of the Western Hemisphere. Now, however, we fear that a successful Germany would use her economic power in an effort to extend her influence over part of this Hemisphere, a development that would threaten our own security. Since we would probably not be strong enough militarily to prevent this, we would like to remove, or greatly reduce, the economic dependence of Canada and Latin America on Europe. But this is an extremely difficult task, and one of great concern to our farmers, since so large a part of the exports of these nations consists of agricultural products also raised in the United States. It is to the problems of the formation of a Hemi-

sphere economic bloc, as they affect the American farmer that the remainder of this article is devoted.

We may as well admit frankly that the United States is the American republic most alarmed by the spread of Nazi power and the one best able to prevent it. Therefore, we must expect to have to make most of the necessary sacrifices. To get an idea of the severity of the economic burden and ways of minimizing it, we shall examine the chief methods of reducing the economic dependence of the Hemisphere upon European markets for agricultural products.

I

Restruction of our own output is one possible method by which we can reduce Hemisphere surpluses. It should be noted that present dependence on foreign markets is not to be measured by total sales to extra-Hemisphere countries but rather by net exports. Many goods are both exported and imported by this Hemisphere, so dependence on outside markets could be reduced to some extent simply by trade diversion. For example, the United States could reduce her imports of Australian wool and buy instead Argentine wool which might otherwise go to Europe. There are some disadvantages in this, however, as can be seen from a few illustrations. Argentine wool is not as satisfactory for some purposes as that produced elsewhere. Peruvian long-staple cotton, is, in the main, somewhat inferior to that secured from Egypt. Hemisphere tobacco is not a perfect substitute for that imported from the Mediterranean countries or the Netherlands Indies. But even if the surpluses were reduced as much as is possible in this way, large amounts of cotton, wheat, wool, coffee, tobacco and other products would still remain unsold.

Some idea of the size and the severity of the readjustments that would be called for if production in the United States were to be reduced in an effort completely to eliminate the *net* Hemisphere surpluses (Hemisphere exports minus Hemisphere imports) can be obtained from table 1. Most of our chief crops are included in this list of leading surpluses. If we were to reduce our output of them to eliminate the surpluses of the entire Hemisphere, about one-sixth of our crop land would have to be shifted to other uses or left idle.[1]

[1] A flaxseed surplus would remain even if we stopped production completely; certain other surpluses, of which coffee is much the largest, are omitted from table 1 because we do not produce them at all.

The number of farm laborers who would be displaced by the restriction of output would be close to 1,000,000, about one-eleventh of all farm laborers employed in 1939. This figure would be far larger if we had included the producers of minor surpluses and all the other workers whose jobs are dependent upon the production, processing and handling of agricultural surpluses.

The new allocation of the factors of production resulting from our reduced output of Hemisphere surpluses would probably tend to reduce our standard of living somewhat, but probably the greatest loss would arise during the period of transition from the old economy to the new.

TABLE 1. NET HEMISPHERE AGRICULTURAL SURPLUSES: THEIR RELATION TO PRODUCTION IN THE UNITED STATES
(Average, 1935–38)

Commodity	Hemisphere surplus as percentage of U. S. production	U. S. land acreage required to produce an output equal to net hemisphere surplus (millions of acres)	U. S. workers required to produce an output equal to net hemisphere surplus*
Cotton	61.2**	17.6	612,000
Wheat	34.0	19.9	44,000
Corn	11.2	14.2	121,000
Oats	3.5	1.3	4,000
Barley	14.9	1.5	6,000
Leaf tobacco	34.8	0.6	65,000
Flaxseed	513.0	1.3	4,000
Sugar	6.6	0.1	4,000
Beef products	15.6	†	24,000
Pork products	4.7	†	45,000
Mutton and lamb	13.9	†	6,000
Hides and skins	52.8	†	†
Wool	48.9	†	†

* The number of man-hours required to cultivate one acre or to raise one head of livestock has been calculated by WPA National Research Projects studies. The data used here give estimates for 1941, pronounced trends in output per man being projected to that date. The average annual working time per farmer used was 2,500 hours.

** In calculating the cotton surplus the average yearly increase in carryover was added to net exports.

† Data not available.

Sources: Department of Agriculture, Agricultural statistics,1940; J. L. Apodaca, Agriculture's role in Hemisphere defense, Foreign Agriculture, March, 1941.

The farmers of the United States cannot justly be expected to shoulder the costs of implementing our Hemisphere policy. The 25 per cent of our population living on farms receive only about one-half as much real income per person as non-farm dwellers.[2] In 1937

[2] John D. Black, Measures for the improvement of agriculture, American Economic Review, 30(5): 167–68, 1941.

more than one million farm workers were without jobs (government emergency jobs excluded) and an even larger number were partly unemployed.

Severe losses and hardships would result from limiting our output of "Hemisphere surpluses." The southern states—where farm incomes are already lowest—would be by far the hardest hit. Cotton,[3] tobacco and corn are the crops where the largest labor displacement would be necessary; also the alternative opportunities available to the producers are most unattractive in much of the South.[4]

Cotton acreage already has been reduced by about three-eighths since the New Deal restriction policies went into effect. Agricultural unemployment, caused by these policies and by the mechanization of production, would be greatly increased if output had to be reduced by more than half. Readjustment difficulties would be particularly great in the southern Piedmont area and in the hill areas east of the Mississippi River. The best alternative enterprises for the southern farmer are livestock, dairying, hay and pasture, fruit, vegetables and timber. But unfortunately, the South has too many farmers in relation to its natural resources to be well adapted for these changes. In 1924–37 the average harvested acreage of principal southern crops was only 5.3 per farm worker, compared with 13.7 for the rest of the nation. The pressure of population has resulted in low wages, and they, in turn, have encouraged the cultivation of crops like cotton and tobacco, which require a large amount of labor per acre.

Moreover, most of the better alternative crops for the South are already being produced somewhat in excess of Hemisphere needs. The major shifts would apparently have to be to non-agricultural occupations or to a relatively self-sufficient economy. The former transition would be hampered by the relatively small amount of industry in the South. Many authorities have long been recommending, for southern farmers, a greater amount of self-sufficiency with diversified production as a method of improving the level of living, particularly to remedy serious diet deficiencies. "Nearly a million farm families in the South are without a hog, three-fourths of a million have no milk cow and a third of a million do not own a

[3] It has been estimated that 14 million persons in the United States are dependent directly or indirectly on the production of cotton for their livelihood. See Federal Surplus Commodities Corporation, Can we use our cotton at home? 2.

[4] Department of Agriculture, Regional adjustments to meet war impacts, is a good study of the effects of production shifts in various parts of the United States.

chicken."[5] But if farmers are pushed too far in the direction of self-sufficiency, it will mean lowering the standard of living and sacrificing the material advantages of the machine age. And it even seems unlikely that the ordinary share cropper has enough land for a relatively self-sufficient existence.[6]

In the Corn Belt readjustments to eliminate Hemisphere surpluses would be far less difficult than in the South. But even there the readjustments would not be as simple as might at first be suggested by the varied output of the region. The best alternatives are livestock or feed crops for livestock, all surplus products. Yet, since the surpluses are relatively small, shifts to non-agricultural employment, an increase in consumption and a greater amount of self-sufficiency might solve most of the problems of this region fairly easily.

The large wheat surplus in the Great Plains and the Pacific Northwest would create a serious readjustment problem. These regions are heavily dependent on wheat and have no good alternative crops nor large nearby industries to which the farmers could turn.

The readjustment problem would be even more difficult for the farmers of the Range areas. The Western Fruit areas would be called upon to reduce their production of apples, of oranges and of pears by about one-tenth and the production of a number of dried fruits even more. Shifting to other lines of production would not be particularly difficult though owners of some orchards would lose heavily. If we were to buy less from non-Hemisphere sources, we would want more home production of such products as olives, figs, dates and various types of nuts.

The Lake states and the Northeast would find it necessary to restrict production very little since they are not important producers of Hemisphere surpluses. What difficulties they might suffer would arise chiefly from increased competitive production of dairy products, fruits and vegetables in other regions.

Hemisphere self-sufficiency would demand severe contraction in United States agriculture. We might increase our production of certain fats and oils and fruits and nuts previously secured from extra-Hemisphere sources, but such increases would probably not

---

[5] G. H. Aull, JOUR. FARM ECON., 23(1): 122, 1941.

[6] Calvin Hoover, Agrarian reorganization in the South, JOUR. FARM ECON., 20(2): 478–479, 1938.

add up to $100 million, a figure only about one-fifteenth the value of Hemisphere net farm surpluses. More self-sufficiency would mean fewer farmers and lower real incomes for those that remained. Those that shifted to other lines of work would have to learn new skills, to move long distances and to adjust themselves to different social environments. Large-scale shifts would be impossible except when the rate of business activity was at a high level.

Past experience gives us no assurance that we have learned how to secure such large production changes. By and large, the AAA has *not* succeeded in reducing output, and even with generous commodity loans and hundreds of millions of dollars of annual benefit payments, the farmer has never attained as favorable a real income position as he had in 1910–14.

Perhaps measures of the nature used by the AAA could eliminate Hemisphere surpluses, but only by greater reductions in acreage, more extensive applications of marketing quotas and more liberal payments of farm benefits. Furthermore, two problems with which we have so far made little attempt to grapple would become serious. In the first place, the AAA policies have removed good land as well as poor land from cultivation. The resulting economic waste would become much more serious if the reductions in acreage were greatly increased. Secondly, AAA legislation already passed has created agricultural unemployment. The reduction of cotton acreage, combined with technological developments and droughts, displaced thousands of farmers, whose plight was pictured with such harsh realism in *The Grapes of Wrath*, but this readjustment is only a taste of what would occur if our output were restricted enough to eliminate the surpluses of the entire Hemisphere.

The United States has shown no genius for solving the sort of economic and social problems which would arise, but we have some idea of what would have to be done. For one thing, the government might well undertake a giant conservation program with the use of temporarily displaced workers in regions where restriction of output would be most severe. (Much of the land most in need of conservation is in the South.) An extensive program would be needed to retrain workers, those who would have to produce new farm products as well as those who would shift to non-farm jobs. A much better federal employment service would be needed. Large government expenditures would also be needed to pay the cost of moving families from one place to another and to enable farmers shifted to

new enterprises to buy the equipment and the land necessary for efficient production.

II

If economic integration of the Western Hemisphere is to be combined with military protection of the Americas, our defense program can be used to facilitate the needed agricultural readjustments. Most helpful would be the location of defense industries in areas where the number of farmers would need to be reduced most. The government has at present much more influence over plant location than ever before in peacetime.

An excellent example of what can be done is the location of a smokeless powder plant, requiring about 5,000 workers in Radford, Virginia. The surrounding counties are over-populated, with no industrial area nearby. A large part of the farm families have had cash incomes of $300 to $500 annually. In the new plant every reasonable effort has been made to employ workers from the farms.[7]

Our defense effort requires considerable amounts of land for cantonments, bombing ranges, proving grounds and artillery ranges. Whenever feasible, these could be located in areas where land was to be taken out of use. The location of training camps in distressed farm areas would also help nearby farmers by affording new markets for fresh fruits and vegetables.

But actually defense establishments are not being located in such a way as to aid many displaced farmers, and the government's effort to secure such location has been largely abandoned. Because of haste and the need for supplies of skilled workers and for the products of other industries, the defense program has promoted the expansion of old industrial areas rather than the development of new areas.

If we can make tremendous changes in our economy in order to build a great military machine for our defense, we can also make great changes in agricultural production if it is thought necessary for our security, but we can do neither without great cost and without far more government regimentation than we have had in the past. Such a course is now politically unacceptable and will undoubtedly continue to be so unless the need for Hemisphere solidarity becomes much greater, or more fully recognized.

---

[7] Chester C. Davis, Agriculture and the defense program, Federal Reserve Bull., 1169, November, 1940.

III

The idea that we should consume the surpluses has a wide appeal. Consuming them would be the best solution under two conditions: (1) if failure to do so would leave the producers idle, or (2) if the consumption of these goods is being unduly restricted by the inequality of consumers' incomes.

It is important to inquire first whether moderate reductions in prices would increase sales substantially. Careful estimates of the elasticity of demand have been made for some of the surplus commodities. Henry Schultz estimated that to secure a 1 per cent increase in sales of cotton, wheat, corn, barley or sugar would require at least a price decline of approximately 2 per cent. The two largest surpluses, cotton and wheat, had the most inelastic demand.[8] The demand for oats, tobacco and coffee[9] also appears to be relatively inelastic.

Reductions in prices of meats, vegetables, fruits, dairy products, wool and flaxseed would probably have more beneficial effects on sales. Imports of canned Argentine beef—only imports of the cooked product are likely to be permitted—would probably increase greatly if prices fell as the result of tariff reduction. Low prices would stimulate purchases by many families now using little beef, and so only part of the increase in imports from Argentina would be at the expense of American producers.

Are the demands (amounts that would be purchased at given prices) for these surplus commodities increasing or decreasing? Per capita (or per animal) demand appears to have been decreasing recently for cotton, wheat, corn and meat, products which are among the major surpluses. Demand is thought to have been increasing for fruits, fresh vegetables and coffee. For most of the other surpluses no definite demand trend is observable. In any case, the "natural" increase in demand could not be expected to furnish any significant contribution to the solution of the Hemisphere surplus problem in the short-run, when transitional problems would be most serious.

Increases in the demand for farm products, however, would result from a general increase in the national income or from a more

[8] The theory and measurement of demand. The elasticity of demand for wheat was 0.21 ± 0.04 (1921–34).

[9] The annual net hemisphere surplus of coffee was 1,167 million pounds (1935–38), equal to 64 per cent of our consumption. Valued at our 1937 import price, it was worth $104 million.

equal distribution of wealth, since the poor spend a larger percentage of their income on farm products than do the rich. An increase of $15 million in the national income might increase farm incomes by $1.5 million,[10] but a concomitant general increase in prices and costs might prevent farmers from benefiting.

The 42 per cent of all families in the United States which had incomes of less than $1,000 in 1935–36 constitute a great potential demand for farm products. It has been estimated that if no incomes had been below $1,200 the greater expenditures resulting would have increased farm incomes by $1 billion.[11]

But higher incomes would not affect the purchase of farm products uniformly. The higher the incomes, after the $500 to $999 bracket is reached, the less wheat is consumed. Income increases beyond this point do not increase sales of pork very much, but income elasticity of demand is greater for the more expensive meats. Even so, all the surplus meat and feed grains would not be absorbed unless incomes increased greatly. Purchases of fruits are quite sensitive to changes in income, considerably more so than purchases of vegetables and eggs. The income elasticity of demand for cotton is greater than that for most foods,[12] but it has been estimated that if all family incomes below $2,200 were raised to that level, cotton consumption would be increased by only two million bales[13]—an amount less than the annual United States surplus even at the present (September 1941) high rate of mill consumption.

Uncontrolled expenditures of higher incomes are not likely to absorb the Hemisphere surpluses, but perhaps the effects would be different if we were to take steps to see that every family has a good diet. It came as a shock to many people that at least 13 per cent of the young men examined for military service have been rejected because of undernourishment.[14] But it should not have been a surprise when we recall that in 1935–36 the lowest income third of non-relief families spent on the average only $236 per year on food, and that the 20 million persons on relief in 1940 spent only about

[10] L. H. Bean, Relation of industry to agriculture with special reference to the lower third, 7. (Mimeographed.)

[11] Federal Surplus Commodities Corporation, The challenge of underconsumption, 10.

[12] *Ibid.* The study gives in its appendix data on purchases of cotton and a number of foods by families in various income groups.

[13] Testimony of Mr. Milo Perkins, Hearings on the Agriculture Department Appropriations Bill for 1942, pt. I, 33.

[14] Statement by Lewis B. Hershey, Deputy Director of the Selective Service Commission, reported in the New York Times, May 28, 1941.

5 cents per person per meal (food-stamp assistance excluded). Undoubtedly we should endeavor to correct this situation. What would the increased consumption mean in relation to the problem of surpluses?

Mr. H. R. Tolley of the Department of Agriculture has stated that if every family were to receive an adequate diet at moderate cost[15]—the best diet that we have any practical chance of securing—our consumption of cereals would be *reduced* about one-third, our consumption of sugar one-half, and our consumption of beef cattle one-fourth. Thus some of our most troublesome surpluses would actually be *increased*. Such a diet would require the consumption of more fruits and vegetables and 70 per cent more dairy products—a shift which would give only minor direct assistance in the solution of the problem of surpluses.

We have had some experience with efforts to enable the poor to buy more goods by controlling their purchases in such a way as to eliminate surpluses. The food-stamp and school-lunch plans and the cotton-stamp and cotton-mattress and comforter programs are the most important steps being taken in that direction. Four million persons, practically all of whom are on relief, now benefit from the food-stamp plan and are enabled to buy 50 per cent more food, although their purchases are restricted to certain "surplus" commodities. Five million school children in low-income areas receive free school lunches prepared primarily from surplus farm products. If sufficient funds were available, an additional four million children might well be aided.

But if these programs are to be used primarily for the benefit of low-income consumers, instead of farmers, they will be far from adequate in removing Hemisphere surpluses. They are conducted on too small a scale, and also, as has been shown, a really well balanced diet requires less of some of the surpluses than is now being consumed and more of certain products of which there is no surplus.

The cotton-stamp plan enables, at present, a small number of families on relief—136,000 in May 1941—to double their purchases of cotton textiles, but processing costs are so high that only 15 per cent of the retail price gets back to the cotton farmer. More promising is the cotton-mattress and comforter program, which, if extended to all families with incomes below $50 per month, might use

[15] One of the diet standards set up by Stiebeling and Ward.

as much as 600,000 bales of cotton annually for a few years.[16]

Experiments are constantly being made to find new uses for farm products and may greatly increase demand, but experts see nothing now in the process of development which will entirely eliminate any major surplus.

The growing population and the rising standard of living in Canada and Latin America is increasing the consumption of most of the surpluses, but this trend will be of little assistance in the critical period of the next few years. Economic and political conditions in most of these countries are such that government action is unlikely to stimulate large increases in consumption there in the near future.[17]

The United States might be able to make arrangements with other countries of the Hemisphere by which our government would agree to increase the consumption of their surplus products on condition that their governments increase the consumption of ours. It has been suggested that we might buy cocoa to be used with our free school lunches while the cocoa producing countries might agree to buy more of our prunes and distribute them to their needy citizens. But inadequate public revenue and the absence of suitable government machinery in many countries make it appear unlikely that much can be accomplished through such international agreements.

Increased consumption, like restricted production, can probably not be secured in the United States without heavy government expenditures. Such expenditures to increase consumption together with the continuance of a high rate of industrial activity could help very substantially in eliminating many of the surpluses, especially if combined with some output restrictions, but a number of the greatest surpluses such as cotton, wheat, coffee, and sugar would continue to create perplexing problems.

IV

Certain writers have suggested that if we were to purchase from this Hemisphere the non-competitive agricultural products, such as rubber and silk, now imported from other areas, Latin American farmers could substitute them for their troublesome surpluses. Giv-

[16] Federal Surplus Commodities Corporation, Can we use our cotton at home? 13. In May 1941, 272,000 persons received mattresses or comforters.

[17] It may be noted, however, that Brazil has given oranges free to low-income families recently when lack of shipping space limited exports.

ing farmers an alternate crop is a fine idea, but does this plan offer satisfactory alternatives?

In the first place, it should be noted that the value of non-competitive agricultural products imported into the United States from the Eastern Hemisphere (see table 2) in 1937–39 averaged only $430 million annually, not one-third the value of Hemisphere surpluses.

Besides we must not think of Latin America as a single area where all land and workers can be readily shifted from one product to another. The great surpluses are almost all products of temperate regions, grain and livestock products from Argentina and Uruguay, cotton and coffee from southern Brazil, etc. But the agricultural products which the United States imports from extra-Hemisphere sources are almost all tropical products. Coffee plantations cannot be converted into groves of palm trees nor wheat fields into rubber plantations.[18]

We now buy practically all the Latin American output of most of the products listed in table 2. Cocoa and cacao beans are the chief

TABLE 2. UNITED STATES IMPORTS OF CERTAIN TROPICAL PRODUCTS
(Average, 1937–39)

Product	From non-hemisphere sources (thousands of dollars)	Percentage of imports coming from Latin America
Rubber	$183,321	1.3
Silk (raw)	105,416	—
Jute	38,639	—
Tea	20,256	—
Cocoa and cacao beans	18,006	46.0
Tung oil	14,583	—
Olive oil	11,300	—
Palm oil	10,414	—
Sisal and henequen	6,693	39.7
Tapioca	5,551	4.8
Abaca	5,033	—
Cashew nuts	3,884	.1
Kapok	2,368	4.3
Perilla oil	1,999	—
Peanut oil	1,162	—
Palm nuts and kernels	751	29.0
Cinchona bark	733	.4
Total	$430,109	

Sources: J. L. Apodaca, Agriculture's role in hemisphere defense, Foreign Agriculture, March, 1941, 93; Department of Agriculture, Agricultural statistics, 1940.

[18] There are a few possibilities of substitution such as cinchona bark (the raw material from which quinine is extracted) for coffee.

exception. We could buy a larger part of our imports of these two products in Latin America, but the cost would be greater since our large imports from Africa are of the cheap "ordinary" grade. But in most cases larger purchases by the United States would depend on a greater output.

Undoubtedly most of these products can be raised in the Western Hemisphere. In fact many of them were first found growing here. But something other than chance has resulted in their being cultivated more extensively in other areas. Many can be grown most cheaply where labor is relatively abundant and wages low, but most of Latin America is not densely populated and is in this respect at a disadvantage as compared with the Orient where so many tropical products are grown for the world market. Then, too, the colonial systems of The Netherlands and Great Britain seem to have been effective in developing tropical agriculture. Governmental systems which favored investors and which encouraged research in tropical agriculture have done much to enable the East (and to a lesser extent Africa) to outrun this Hemisphere in the production of rubber, tea, palm oil, cinchona bark and many other tropical products.

Two of our tropical imports, rubber and silk, are far more important than the others, their combined values being two-thirds that of the entire group listed in table 2. If one or both of these cannot be supplied by Latin America, our imports of tropical products from this Hemisphere are not likely to be greatly increased.

Hundreds of thousands of acres of land and about a quarter of a million workers, according to a recent estimate, would be needed to produce in Latin America the rubber imported by the United States in 1939.[19] Unquestionably the rubber tree will grow in this Hemisphere—this is its original home. But can it be grown at a reasonable cost, and how long will it take for production to get under way?

Experts in the Department of Commerce have estimated that rubber can be produced in Latin America from present, improved strains of trees at five cents per pound,[20] about one-quarter of the

[19] C. M. Wilson, Central America, 212. Mr. Wilson estimates the amount of land required as two-thirds of a million acres; Henry A. Wallace thinks it might be two million. (Inter-American agricultural coöperation, Mexican-American Review, July, 1941.) However, it is thought to be possible to grow all of our rubber imports in such a small country as Costa Rica or Ecuador.

[20] See E. R. Burkland, Speaking of rubber, Agriculture in the Americas, February, 1941, 9.

present price of natural rubber and one-fifth the estimated cost of synthetic rubber produced on a large scale. Five cents may be too low, but, at least, the Department of Agriculture believes an expansion of production to be well worth experimentation. Twenty-five of its experts spent from July 1940 to March 1941 investigating the possibilities of production in the area from Brazil and Peru on the south to Mexico on the north. High-yielding clones of the Hevea rubber tree are being assembled at central propagating stations in Honduras and Haiti. At the end of the first growing season the budwood will be sent to seeding nurseries in all of the coöperating republics. From the time of the original planting of the seeds to the first tapping of rubber trees on the plantations will take nine years,[21] but the maximum yield will not be reached until several years later.

In the long run it is quite possible that Latin America will be able to supply us with large amounts of rubber, but in the near future, when the need is likely to be greatest, the supply from this area can be of little more importance than it is at present. Investors in rubber plantations also face the risk that synthetic "rubber" may eventually displace natural rubber in the United States market.

Raw silk has been grown experimentally from time to time in the Western Hemisphere for hundreds of years, and experimentation is now being encouraged in Cuba. However, as long as its production requires large amounts of hand labor, Oriental peasant families will probably continue to undersell Latin American producers. It is United States' synthetic fibers that are most likely to replace silk from the Orient, and such a replacement is not going to aid the Latin Americans.

Most of the other products listed in table 2 can be grown in the Hemisphere, but in most cases many years will be required for experimentation, training of workers, improving transportation facilities and waiting for trees or plants to come into bearing. Large investments will be needed, and even then production costs may never be as low as those in other parts of the world.

It may well be that the United States should give technical and financial assistance in the development of such production, but it must not be expected that the benefits will appear quickly, and it must be remembered that such action would be striking a hard blow at the economies of other countries, especially the British, Dutch

[21] E. W. Brandes, Rubber on the rebound—East to West, Agriculture in the Americas, 11, April, 1941.

and Japanese Empires. Buying less from them will force them to restrict their purchases of some of our largest farm surpluses. But if we induce Latin Americans to start producing tropical products for us, we incur an obligation to continue buying from them.

V

Another method of aiding the countries in this Hemisphere that produce agricultural surpluses would be to assist in the establishment of industries there. The countries with the greatest surpluses are those best suited for manufacturing. Their industries, primarily for the production of consumption goods, have been expanding rapidly; the development could be encouraged by the United States through the extension of technical and financial assistance. Some of the producers of farm surpluses could gradually be drawn into these new lines of activity, and the expanding industries would also be helpful in preventing the general business stagnation that might otherwise result from reduced exports. The new industries would probably be devoted largely to the production of goods for domestic consumption, but we might import some of their products, such as luncheon and bridge sets, handmade lace, handhooked and rag rugs, sweaters, jewelry, pottery and chinaware and other goods formerly secured from European and Asiatic markets.

There is some prospect that domestic industrial uses may be found for Latin American surpluses. Argentina might convert a large amount of her corn into alcohol for motor fuel. At present petroleum prices, corn so converted might be worth about 35 cents a bushel, a price that may be high enough to cover the cost of production. Successful experiments also have been made in converting coffee into plastics.

VI

The continuance of a high rate of industrial activity in the United States, and the application of certain of the milder measures here suggested—those that are in the realm of political possibility—could probably deal effectively with the minor surpluses. Something additional, however, would certainly be necessary for a few of the critical surpluses. Wheat, cotton, coffee and sugar raise serious problems which in the author's opinion can be solved only by international production or marketing agreements. Even if the markets of the Eastern Hemisphere are not lost as a result of the present war, the growers of these products face continued hardships. Canada alone has a wheat carryover large enough to supply normal world imports for about two years.

The inter-American coffee marketing agreement which became effective November 28, 1940 might serve as a model for other agreements. Solution of the coffee problem, however, was facilitated by the fact that the greatest importer, the United States, was willing to limit its imports from extra-hemisphere countries and to "police" the agreement. But even so it is anticipated that about 45 per cent of the coffee output of Latin America will have to be disposed of in some way other than by sale to the United States. Destruction or limitation of the Hemisphere coffee crop is going to be necessary if Eastern Hemisphere markets remain closed.

Efforts have already been made to solve by international agreements the sugar problem, which is so important to Cuba and a number of other Latin American countries. The United States is a large consumer, but our effort to give real assistance is limited by the political activities of our own high-cost producers.

An international wheat agreement was reached in 1933, but it soon broke down. Argentina exported more than its quota, and, in fact, has generally opposed marketing restrictions. In 1939 there appeared to be a good chance that she would reach an agreement with the United States, Canada and Australia but the war interfered. Representatives of the United States, Argentina, Canada, Australia and the United Kingdom met in Washington from July 10 to August 3, 1941 and prepared, for submission to their Governments, a marketing agreement to become effective at the conclusion of the war. The United States might well agree to export only very small amounts of wheat annually, but even so, Canada's insufficient, and Argentina's half-hearted, restriction policies would have to be greatly strengthened. Existing export markets are going to be entirely too small for them. Argentinians, and perhaps Canadians also, would be sorely tempted to make political concessions to a Hitler-dominated Europe in order to sell their surpluses. Herein lies one of the most difficult problems in the economic defense of the Hemisphere.

The cotton problem is also serious, especially for the two major Hemisphere producers, the United States and Brazil. We have been accustomed to exporting millions of bales annually, and in Brazil production has been expanding rapidly, partly because unprofitable coffee plantations have been turned into cotton fields. Our carryover at present is greater than our average annual output, and Brazil is likely to have a large surplus before long. She has taken part of our foreign markets by selling below our government loan-

supported prices; we may retaliate by selling on foreign markets at a price below our domestic price. A marketing agreement between Hemisphere producers would be helpful in reducing this type of national competition.

But marketing agreements alone will not solve the production problems. They may hold up prices, insuring each participating nation a certain share of foreign markets, but problems still remain in disposing of the remaining surpluses. Losses on export crops force producers to shift to other lines of production, but this is so slow and painful a process that ameliorative government action is becoming more common. In the United States we have our AAA and similar restriction schemes are being adopted in other countries of the Hemisphere. Although often difficult to enforce, output restriction is preferable to the destruction of surpluses (the burning of coffee, etc.). This fact needs to be recognized by the legislative bodies of a number of the Latin American countries.

The plan for Western Hemisphere cartels proposed in 1940 was generally thought to be impracticable. But if the amounts of major commodities to be sold by each country were limited by agreement, a common hemisphere marketing organization might secure better terms, economically and politically, than unorganized producers could in dealing with a German-dominated Europe.

Economic planning, industry by industry, is likely to set up a group of industries favored at the expense of others and of consumers in general. But in this disordered world it is politically impossible and ethically wrong to allow tens of millions of farm families to suffer because of the contraction of world markets. And if we work out broad national economic plans, fitting industry plans into the general picture, many of the objectionable features of the latter can be avoided.

Unquestionably American agriculture has a great stake in the outcome of the present war. No matter who wins, world trade will face greater difficulties than in the past, but a British victory would undoubtedly keep many markets open to the farmer than would otherwise be closed. If Germany is not defeated, we must be prepared to spend huge sums not only on armaments but also to reduce the economic dependence of Hemisphere countries on Germany. If *economic* defense enables us to reduce our strictly military expenditures, the $1 billion or so a year that we might have to spend on a Hemisphere agricultural program might actually save us money.

RECEIVED JULY 18, 1941

SOCIAL CONFLICTS AND AGRICULTURAL PROGRAMS

KENNETH H. PARSONS
University of Wisconsin

THIS ESSAY presents an attempt to think through the issues presented for social analysis by the conflicts of interests in which farmers are implicated. Since the social action instrumental to the operation of current farm programs may be creating a new frontier of conflicts, this field of action is taken as the focus of the investigation. Yet fundamentally it is an attempt to follow the argument regarding conflicts through the structure of social action rather than to make recommendations for changes in policy.

I

Any farm program is evidently a program for farmers, in the first instance. The demands for a program come from farmers, or persons claiming to represent them. The particular programs may fit into some larger design and have a continuity in purpose which we may term a general policy. And even though this policy may be stated in terms of the general welfare, or some equally broad term, yet a farm program as we have come to use the term means doing something in a public way to assist at least some farmers.

That farmers need help, at least to carry on agriculture in a way which serves public purposes, is the root and justification for such programs. There is a widepsread belief amounting virtually to a consensus of judgment among students of agriculture that farmers are at a distinct disadvantage in our current economy. The purpose of national programs for agriculture is to strengthen the relative position of farmers in the total economy. Mr. Tolley has observed recently: "To the social analyst who is willing to distinguish between results and mechanics, it seems reasonable to conclude that certain groups in our society have long been receiving concealed subsidies which are equivalent to, if not considerably in excess of, those now being received by the farm population. Either the farmers must command a bargaining power equal to that of the other groups in the economy or ways must be found for restraining the pressures which these other groups are exerting on our social and economic organization."[1]

[1] American Econ. Rev., 30(5): 126, February 1941.

Here is implied a theory of the state and a conception of political economy where the goal of public action is some sort of balance between large classes. The state is not merely an umpire enforcing rules but is an active participant in the economy. Evidently it is implied that the economy will function adequately when groups are able to exert about the same pressure. In this conception agricultural programs are intended to increase the power of farmers as a pressure group and to create or restore balance in the whole economy.

Dr. Taylor has indicated that some such conception of balancing interests lay behind the support for the McNary-Haugen bill. Farmers entered the groupistic struggle in the 1920's, as he expressed it, in the attempt to secure some offsets to the lack of competition in other sectors of the economy.[2] Labor was organized behind immigration barriers; "capital" had secured the tariff, banded into institutes and, one might add, had privileges from incorporations that farmers used but slightly. The early goal was also "parity" prices.

However, this early support appears not to stem from the same social philosophy as that represented by Mr. Tolley's remarks. Seemingly early supporters of "equality for agriculture" hoped that the back door attack on the tariff would have a salutary effect on all interests; it might educate them to see the wisdom of a more peaceful way of organizing the economy. Referring to the support for the McNary-Haugen bill, Dr. Taylor observes: "No one among the agricultural economists or prominent farm leaders of the time claimed this to be good political economy, but in the end all agreed that it was the only available expedient. They believed it necessary for farmers to participate in the groupistic struggle if they were not to be exploited continuously. They hoped that the economic war among the groups might lead to a peace and that justice might prevail."[3]

In this statement regarding early farm relief legislation, Dr. Taylor has drawn one of the basic issues underlying the efforts for a farm program, both past and present. Is the attempt to augment and balance interests in an economy sheer political expediency or is it good political economy?

---

[2] H. C. Taylor, The farmer in the groupistic regime. Jour. Land and Public Utility Econ., 16(3): 253–260. 1940.

[3] *Ibid.*, p. 256.

Unless we are mistaken there is much uneasiness upon this issue. One encounters a wide range of positions relative to it. At one extreme are those who accept conflicts of interest as inevitable, and seemingly view society as a fight to a finish. Presumably their program would be that of power politics: let the farmers decide what they want and go after it. At the other extreme are those who implicitly deny that there are any genuine conflicts of interest between groups or among participators in the economy. The test of the validity of a farm program would evidently be not whether it promoted the farmers' interests but whether it served the general welfare or the public good. Probably most students of agriculture find themselves somewhere in between these extreme positions.

II

Some of the difficulties in this problem may be brought into clearer perspective by asking the simple question: Are conflicts inherent and inevitable in the nature of social affairs? Fundamentally, it is a question of fact, although there is the subordinate question of whether it be a fact which economists should handle.

Are social conflicts real and necessary? This question may be answered, at least tentatively, by an examination of the nature of social situations and individuality. A social relationship obviously involves relations between persons. Basically social action is conjoint action; at the base of this co-relative behavior is some method of communication so that persons may know common purposes and objectives. Within this general situation of communication and conjoint action the nature of individuality or personality involves the two contrary relationships of conflict and coöperation.

In any conception of the individual as a responsible being there appears to be a will and deliberate action building a self out of the available opportunities. The self involves an integrating activity. And however one explains the basic drives or impulses in a self, the wants, desires and ambitions of one person collide to a degree with those of others. The social situation, which is the matrix of individuality, sets the conditions which are available to the self—nourishment, habits, ideals, customs and so on; yet conflicts of interest appear to be ingredient to the nature of social relationships.

In the striving to attain one's purposes, even to attain self-hood, one's desires and interests are involved. Yet these should not be interpreted as mere biological expressions. That natural impulses,

by whatever name, do influence desires and interests is undoubtedly true. Yet the interests which we puruse are themselves built up out of the more rudimentary forms of behavior by choices and the taking of thought.

The importance of this for students of agricultural policy should be evident. We simply cannot take farmer's desires, interests, or wants as simple data and the unquestioned grounds for validation of programs. The wants and interests of farmers have histories of their own; and cannot be accepted without some reference to what farmers have experienced and thought possible. Education too has had its part. Consider the farmers' desire for "parity prices." What "natural" farmer ever desired such a goal? Farmers by the million have come to desire parity because they have come to believe that the receipt of parity prices would replace some of the insecurity and wants in their lives by a better state of affairs. Agricultural economists have had their part in moulding these desires.

Yet if the desires may not be taken as valid value standards they are facts to be reckoned with. Implemented with whatever power the person can command they emerge into conflicts in social situations. One of the major problems of social organization is to achieve some sort of a workable adjustment among these conflicts.

These elementary, and lay, comments on the nature of individuality are intended to focus attention on a basic problem rather than to present an adequate statement.[4] However, there is something repugnant to many of us in accepting conflicts as real. It may be due to the stories of the "paradise lost" in our tradition. But whatever the reasons, there is a vast difference in attitude toward conflicts of interests between persons whether one explains them as perversity or as inherent in the nature of things. Upon the latter view, coöperation, tolerance and order become challenges to attainment.

Although, in general terms, social behavior involves conflict as a basic element, society is not a dog fight. We are mutually dependent upon each other: yet it follows that this mutuality is attained out of conflict and can be lost to the same source. We do live by working with each other. What is important here is the realization that the order which has been achieved, through which this mutuality is experienced, is an order built upon ways of settling disputes and resolving conflicts.

[4] For a comprehensive statement on this general problem in relation to value theory, see Charner Perry, Principles of value and the problems of ethics, Revue Internationale de Philosophie, July 15, 1939, pp. 666–683. The essay is in English.

Assuming that conflicts of interests are inescapably an ingredient of social facts, it is proposed in the following sections of this paper to examine the relation of thought and knowledge to the settlement of disputes, to examine some of the implications for the analysis of group interests in relation to social and political organization, to attempt a statement of the outlines of a general theory of social valuation which allows conflicts of interests, and finally to comment on the practical bearing of the treatment of conflicts on selected phases of national farm programs.

III

If conflicts between persons are inherent in the social fabric, then social thought and knowledge regarding social affairs seem to be fundamentally conditioned thereby. If the differences between persons are irreconcilable, then there must be a give and take compromise. Furthermore, this requires something more than thinking about the difficulties; conjoint action can occur only where there is some exercise of the will and the taking of risks.

If such settlements had not been made times beyond number, it would no doubt seem miraculous that men should find themselves at odds, even bitterly, and yet later work out an agreement that could be accepted without rancour or friction. Yet men have undoubtedly been reconciling their differences from the beginning of time. Thus if men are not purely rational, they are at least sufficiently reasonable to see the necessity for resolving differences and getting on with the business of life.

Undoubtedly one of the factors contributing to the reconciliation of differences is the conception of social structure and social organization held by the parties in conflict. This involves some understanding of the problems, claims and alternatives of all parties involved. As Professor Perry has pointed out: "The society in which an individual lives is to some degree an object of knowledge for him, though his picture of society may be vague and confused; and such knowledge is the basis for the adjustment of his behavior to the behavior of other individuals."[5]

If this be true then one of the major tasks of social science would seem to be the presentation of social analyses which reveal to parties in conflict the actual processes by which social organization

[5] Charner M. Perry, Knowledge as a basis for social reform. The International Jour. Ethics, 45(3): 268.

has been achieved. If conflicts are crucial and real then we have a task of studying the generation of strategic conflicts, the way they have been resolved, and the consequences of the settlements that were achieved. One of the most difficult but yet necessary parts of such analyses is the formulation of the principles of policy by which the particular situations were related to a conception of society at large. It also follows, it would seem, that these principles must be principles of action in conflict and not merely a scheme of the ideal state where the problems are presumed to have been settled. The emphasis would seem to shift to the working rules by which order is achieved and an integrated functioning economy is attained.

Yet if these suggestions are correct, there will be a residual of conflict left over to be ironed out in some manner, after all available knowledge of social structure and organization has been utilized. Beyond social analysis and comprehension of the facts there is a necessary element of tolerance and forbearance. That society has actually developed as a going concern with a long history, testifies to the fact that such give and take have been worked into the scheme of things.

IV

A theory of social action requires a theory of social valuation, unless one considers behavior merely as a resultant of pressures and forces. This latter view leaves no significant role for deliberate action and also loses sight of the manifold possibilities of different potential courses of action, depending upon appraisal of the various alternatives, the type of leadership available and many other factors. Since our farm programs have shifted direction and emphasis so many times during the past decade probably few persons would rule out the possibility of choosing different courses of action. Hence, any adequate formulation of a comprehensive social theory which might give guidance to such programs must include a theory of valuation. Such a theory is essentially the core and strategic aspect of any theory of social action.

Anyone would be rash indeed to pretend that there was some ready-made theory of social valuation which could be drawn into a general theory for agriculture. Yet the problem is an old one and the least that a student of the social aspects of agriculture can do is to attempt to see the problem in its own terms and to bring such analyses to bear upon it as he is aware of. The important point here

is to recognize such a problem, if it be one, and to show how it relates to other social issues underlying social action by farmers.

The purpose of a theory of valuation is to formulate principles which can give guidance to the appraisal of different courses of action. Surely this is a familiar problem to students of economic thought, although it may have been discussed in different terms. However, the economic formulations appear to have dealt almost exclusively, at least in recent decades, with problems of individual rather than social valuation.

The principles of economics formulating the conditions of maximum return to the firm are too well known to justify any discussion here. Especially under conditions where the alternatives presented to the director of the firm are in pecuniary terms, the marginal analysis of incremental costs and revenues defines the optimum with precision. The same logic underlies the utility analysis, regardless of what one may make of it as reference to existence. As an aspect of value theory, the principle of economy appears to have been worked out by analyzing the actual structure of the act of choice. The principle of economy appears to be a "universal" principle and implicit in the nature of things. If there is a way for an individual to do something with a minimum of effort, cost or sacrifice it must be true independently of the knowledge regarding it.

Fundamentally, though, the usual economic analysis runs in terms of alternatives to the individual as data and leaves one with a theory of individual valuation, not of social valuation. Where reference is extended to social situations the results of individual valuations may be integrated by a process of mathematical summation. For some purposes this procedure is unquestionably valid, especially where the relevant facts have been regularized by the price system or some other method of rationalization. This summing up procedure seems, however, to carry the implication of making mathematical categories basic in the formulation. If social relationships are as implied in this essay, then we need some more inclusive basic categories. In short the major problem of a general social theory of agriculture is to work a formulation wherein social rather than mathematical categories are basic.

Emphatically this does not mean that we need to abandon the insights and methods of analysis already achieved. Rather, the problem is one of finding the similarities beneath the apparent differences in approach. Each approach to analysis of social problems

undoubtedly has validity within limits. The problem is one of finding these limits, of getting a foundation in social analysis sufficiently deep so that supplemental analyses may be devised and integrated with those already generally accepted. This is the challenge of a general theory of agriculture, whether it be called a social theory, a theory of political economy or merely economics.

The efforts of John R. Commons to work out a theory of social valuation as a part of a theory of political economy seem to us particularly suggestive in this context. The essence of this aspect of his position is the attempt to formulate a theory of social value which embraces both conflicts of interest and collective action. In doing this market values are included as a particular case of the larger category of social values. This inclusion is achieved by several innovations in analysis, among them: (1) The emphasis is shifted from the net income position of the firm to the relation between the firm and the suppliers and customers; (2) the analysis is carried out under conditions which presume that participators may have some influence over price rather than at the conceptual limit of perfect competition; (3) the analysis runs in terms of the conditions under which a meeting of minds or wills occurs in transactions; and (4) a conflict of interest between the parties to the transactions is presumed to be present, at least potentially. By agreement the actual or potential conflict is resolved sufficiently for orderly social action to occur; an incentive to the resolution of differences is the necessity of conjoint action and the mutuality of social behavior under modern industrial conditions.

This is not the place to attempt an exposition of Commons' thought but these brief references may suggest his treatment of market pricing. The focus of his analysis, as we understand it, is the actual market processes of transactions and performance, rather than the more usual analysis of the limits to such action under assumed conditions of supply, demand and so forth. Again, there is no necessary conflict between the approaches. It depends on the purpose of the analysis. If one wishes to know the approximate influence of a large crop on the price of wheat he does not need to analyze the particular transactions and market processes by which the sales are consummated. But if one is interested in the actual regulation of market behavior, or social control in any form, it seems, then, one must understand the actual behavoir.

Reference is made here to this phase of Commons' analysis not

only because the actual market behavior is fundamental in terms of social fact, but also because kind of social relationships implicated are much more generally a part of the scheme of things. He says, in effect, that we have these vast orderly markets because the behavior of parties thereto has been stabilized by the rules of the game. Units of measurement, monetary as well as physical, have been worked out for the purpose of making more secure the expectations of the parties involved. It would be to the buyers' immediate interest, for example, to purchase No. 1 wheat as No. 2, and perhaps this does occur sometimes. What prevents the more frequent occurrence of such things is the regularization of procedures, the formulation of working rules and so forth in conjunction with a large number of alternatives available to both sellers and buyers.

The point is that a regularized procedure has been worked out which narrows the zone of possible conflicts and differences. Differences there are, of course; a farmer may feel aggrieved for years over a particular sale where he believes his product to have been sold below grade, on short weight, or what not. And occasionally these differences reach the courts. These occasional lawsuits have the effect of forcing virtually all transactions to be carried out in terms acceptable to the courts as measures of performance.

Indeed Commons seems to insist that the actual and potential settlement of disputes by the courts has placed the courts in the position, historically, of promulgating the rules and procedures by which order is attained out of conflicts. Among the principles followed by the courts has been that of a "willing buyer and a willing seller." Following this principle the courts have determined from time to time the extent to which private power is permissible, in view of the justice of the case and the necessities of public order. The resulting social behavior has achieved the vast open markets which are now available to farmers, and others.

That Commons has analyzed the social relations in transactions and the value theories of courts is well known to even the casual readers of his work. But it may not be so apparent that both of these analyses root in his theory of social value. Transactions are a way of working to order from conflict. The procedures of courts formalize the practices followed by the most rudimentary social groups of selecting out those social practices which promote concord and facilitate social intercourse. Commons' procedure has been to study the ways conflicts have been reconciled; but as a founda-

tion for the search there is the evident belief that both justice and order derive from and depend upon the ways in which disputes are settled.

This is a striking position. We do not settle disputes by considerations of what is good in terms of some general social philosophy. Our conception of what is good social policy derives from the way we settle disputes.[6] Professor Charner Perry, recognizing the fundamental nature of conflicts arrives at a similar conclusion, "... morality must be based upon provision for settling disputes, rather than the settling of disputes being based on morality."[7]

The quotations and the sketch of selected aspects of Commons' thought have not been presented as touchstones for the solution of problems involved in agricultural programs. Yet they may suggest some of the fundamental issues for both social analysis and social organization which are ahead of us if we really follow through on a farm program involving social conflicts and proceeding by the methods of pressure politics.

The general problem of orderly social intercourse is obviously much broader than the market nexus. Yet the relationship of conflicts to markets may serve to illustrate the larger case. What we may literally call the whole social order evidently has been achieved from a natural base of conflict and confusion. But by a long process of rule making, largely by the settlement of disputes as they have arisen, our ancestors have achieved a form of social organization so regularized, stabilized and ordered that we run the danger of considering this achievement as the natural order.

Furthermore, this order of problems appears to be forced upon students of the social aspects of agriculture by the issues implicit in current farm programs. There are the conflicts between the great social groups, of farmers and laborers, and of each against countless other coalitions. The execution of the farm programs inevitably involves conflicts among farmers themselves. If there are conflicts we simply must recognize them, or court the dangers of running blind. The success of our forebears in surmounting similar difficulties should be a source of both instruction and inspiration to us.

---

[6] See for example, Institutional Economics, p. 225.

[7] The arbitrary as basis for rational morality, International Jour. Ethics, 43: 144. 1932–33. See also his, Principles of value and the problem of ethics, Revue Internationale de Philosophie, July 15, 1939.

V

The dual system of government in the country in conjunction with private enterprise and private property in our economy appears to be particularly conducive to the formation of pressure groups. That individuals have interests that conflict seems to be true under any form of social organizations; the way these conflicts are reconciled, the way interests coalesce into pressure groups and the manner in which pressures spend themselves are evidently dependent upon the particular forms of economic and political structure. Authoritarian forms of government do not prevent conflicts; they simply crush them. Under our variety of western liberalism the individual citizen counts; and the privileges of capital accumulation, private enterprise and investment all converge (with many more features) to give individuals (and corporations) independence and power. Furthermore, since our political representation is on population and geographical rather than interest bases we find at the legislative level much shifting of political alignments and pressures according to particular issues at stake. It is within some such scheme of things that farmers, along with virtually everyone else, have formed pressure groups.

While many people profess alarm at the activities of pressure group and appear to wish that they would disappear, they are evidently a permanent part of the social scheme in this country unless some revolutionary changes occur. Voluntary groups, including those formed to exert pressure, are permitted as a policy of a tolerant or liberal government. They are formed because the participants believe they can attain some objectives collectively which they cannot reach as individuals. That we have had such groups throughout the whole history of this republic, probably no one would deny. Manufacturers and financial interests have secured tariffs in great numbers. Interested parties have been granted the privileges and immunities of incorporation with limited liability; the frontier farmers obtained the homestead law; labor has won immigration restriction and recently the legal right to form unions as well as some measures of social security. The list is endless. But when one asks the questions of why we have them and what alternative procedures there are, is there any likelihood of avoiding pressure groups?

No, we seem destined to have pressure groups as long as we have

any liberty in deciding our own future. Economic and political power are facts. If we cannot do away with them without incurring a worse state of affairs, we must live with them and somehow learn to avoid the more dangerous pitfalls.

The increased activity of group or organizational activity on behalf of both farmers and laborers has been a striking feature of recent years. Both represent relatively recent growths; and both have achieved such dimensions as to be obtrusive features on the social scene. In a very real sense both are growths outside of previously established methods of social organization. As diverse in their purposes as these organizations may seem, they appear to stem from the same structural changes going on in the economy; the growth of a large-scale urban industry; and the readjustment of the relation of government to economic organization.

Why do we have labor unions? It is a commonplace that the industrial revolution and the rise of cities have had as a counterpart the differentiation of the urban labor class. As a group they have fallen heir to no security comparable to that of farmers through land ownership. Whatever security laborers have achieved has come through adjustments in the rights in the job. Historically, and in terms of the inheirted law, the job has belonged to the employer. Laborers through collective action have achieved security in the job only through acquiring certain rights for themselves which placed some limits on the employer's right to hire and fire. In the American labor movement, at least for the past 50 years, there has been little disposition to displace the employer. Rather unions have preferred that the employer carry the risks of business and meet the payroll. They have been concerned to win for themselves a niche with some security. The limit, in a mathematical sense, of union design and effort has been to acquire union ownership of the job.[8] This limit has been approached in only a few instances.

The fact that urban workers have been exposed, in an unparalleled degree, to the hazards of change and uncertainty in our economic system has given their activities peculiar character. For many decades prior to the New Deal they have not relied very much on advancing their interests by political measures. This policy represented a recognition of the limitations implicit in both our dual state-federal form of government and the general temper of

[8] See Selig Perlman, A theory of the labor movement, Macmillan, 1928, esp. Chap. V., Labor and capitalism in America.

the American community especially with regard to property.[9] Unions learned by bitter experience that gains won from one unit of government might be offset by an act or decision in another. Battles won in legislatures were lost in court; or one state legislature was limited in what it could do by the possibility of different action by legislatures in other states. At any rate, and whatever the reasons, unions relied for decades largely on economic weapons, such as the strike, picketing or boycott.

With the advent of the New Deal, and partly in opposition to its more conservative leadership, urban labor has been supported by many measures designed to increase their security. These include the right by law to organize, provisions for unemployment compensation, minimum wages, maximum hours and retirement pensions for large numbers of urban workers.

All of these attainments by and for labor point in the direction of promoting the welfare, advancing the interests, or giving more security of expectations to workers. Again these actions are intended to stabilize or safeguard the interests of some, not all, laborers. However much warfare there may have been between differnt labor groups, the group struggles of labor have been made virtually inevitable by the rise of large-scale industry. Laborers as individuals are powerless; as an organized entity their voice is heard.

Farmers entered the recent era of industrialization with some substantial victories behind them. The right to own land in fee simple which their forebears had won for them in the English Parliament centuries before had been given greater content by the liberal land policies of this country. Ownership of a farm promised security and a livelihood.

Under a "pioneer" or "self-sufficing" system of agriculture, land was valuable because of the uses to which it could be put in producing things for the family livelihood. But with the rise of commercial agriculture, the value of uses derives primarily from the cash income attributable to it: in short, the value of land reflects access to markets. One of the striking implications of this transition is the great shift in what may be called social expectations. In a system of family production for its own use, social security means essentially the freedom from molestation; the behavior of other persons must be so stabilized that theft, trespass and other predation

[9] Perlman, supr. pp. 201–202.

will not rob a family of the fruits of its own labor. But for farmers to get security in a commercial economy of agriculture, the remainder of the population must not merely "keep off"; they must buy the farmers' products at remunerative prices.

As the operations on the individual farms have shifted from primarily production for use to production for sale with extensive purchases for use, the farmers' attitudes toward the market have changed correspondingly. Attempts to perfect the markets, including the efforts to reduce the "take" of middlemen, were launched and then supplemented by campaigns to stabilize prices and institute "two-price" plans. The current farm programs have among their objectives the use of government funds to supplement farm income obtained from markets.

As the great economic catastrophes and difficulties since the first World War came home to the farm families as lower prices and reduced incomes, the spectre of want, foreclosure and poverty struck terror in their hearts. Only the federal government had sufficient power to hold out any promise of security in the face of such disasters. The outcome leaves us with changes both in the content of security of expectations and the relation of government to the farm economy. The creation of security of social expectations has always been preëminently a function of government in this country. Security in the rights to enjoy the use of the land derives from the action of the law, primarily through state and local governments, in stabilizing the behavior of other persons by imposing duties upon them. Now the content of security of expectations is being enlarged to include expectations of income; this has drawn the powers of the federal government directly into the farm economy. Perhaps it would be more accurate to say that we are now in the process of finding out the possibilities and disabilities inherent in programs by the national government for farmers.

What the federal government does for farmers must be done with the limits of the judicial interpretation of the power delegated by the Constitution. The limited number of federal powers, the natural functioning of governments to define permissible spheres of activity by telling us what we cannot do, and the nature of the agricultural economy have combined to make farm programs depend heavily on appropriations. We have introduced soil-conserving practices and restricted crop acreage, not by telling farmers what they must

do, but by combining cash with designated alternatives so that a farmer could both "comply" and get a larger income than by following other alternatives. Some businesses can be given a boost by a tariff restricting imports; some laborers may have their incomes increased by denying the right of passage in interstate commerce to goods made with labor paid less than a minimum wage; but with farmers who carry the risks of business and together operate a plant geared to an export surplus, doing something positive and additional in recent years for the farmers has meant appropriations. The marketing agreements are an exception to this, as are also the marketing quotas but even the latter find their primary inducement in the prospect of government loans.

These remarks on organized labor and the drives for farm programs may suggest how difficult it is to make any precise and literal interpretation of the balancing of interests in the total economy. Each group brings pressure where there is some prospect of gaining some ground. The politico-economic organization is adjusted in some details by each action, and the economy keeps on functioning —somewhat and somehow. But the group conflicts never all come head-on in a way comparable to a labor-employer negotiation over the terms of employment. The nearest approach to a point of convergence of interests and group conflicts under our scheme of things is to be found in Congress. But even in the case of appropriations is any precise balance possible?

While an examination of the actual processes by which group pressures operate may make one wary of taking any simple view of the possibilities of equalizing bargaining power between groups, yet interest groups and group pressures we are surely destined to have as long as men have any freedom and private power. It should also be remembered that the most powerful lobbies and pressure groups are for interests other than laborers and farmers.

But there is a point in considering the parallel cases of labor and farmer pressure groups; both represent mass movements. Both reflect attempts to achieve larger opportunities or greater security for their members than they have without the effort. That there are conflicts between the aims of the two groups is beyond argument; but that there are zones of mutual benefit is equally true.

If the issues are as the analysis in the essay implies, there is no categorical answer to the farmer versus labor question. But such

an answer is not necessary; what we need is a formulation of the principles of social organization and social value which can give guidance in settling differences as they become crucial.

If one considers such a simple question as the rate of wages a farmer pays to hire a union workman, or the price of farm machinery, much of the value issue may be seen. How would one know when wages are too high? How does one, in principle, determine when any price is too high, or too low?

Such questions are very old. In principle, they were answered by the common law conception of a willing buyer and a willing seller. In short, any free sale, one free of coercion, duress or fraud, was a bona fide sale, and the resulting price was fair, simply because a fair price was that arrived at fairly—by mutual consent. Following this principle, if one were to decide whether the price were fair he would not necessarily be concerned about the price at all; the strategic question would be one of the willingness of the participation in the transaction.

But the adequacy of this principle obviously diminishes as the degree of power held by the buyer or seller increases. Presumably equal bargaining power of union-employer would still hold the possibilities of a "willing" sale. But where bargaining power was disparate the sale would not conform; under such circumstances, if a dispute were to be settled, evidently some court would have to decide the degree of permissible power which could be tolerated.

The point here is not to present a discussion of cases of price discrimination, or unfair competition; which we could not do. However, the issue may now be more clear: it is the existence of private power which makes the principle of a willing buyer and a willing seller inadequate. The challenge to thought and ingenuity is to work out principles which shall be adequate for the guidance of social policy where power is real. Attempts to substitute for guiding principles the determination of "fair" or "just" prices inevitably involves us in authoritative price fixing, as Professor Hibbard pointed out at the 1940 annual meetings.[10]

This certainly does not mean that any price which a union can get away with is the best arrangement imaginable. Undoubtedly prices can be too high either for the union's own good or before some bar of absolute justice. We simply have no access to the latter. As to the former, substitution is a fact, and no organization can

[10] B. H. Hibbard, American Econ. Rev., 30(5): 155–164. 1941.

escape the economic consequences of its own price policy. As T. V. Smith has remarked, persons who shape events are disciplined by events. Since acts by groups as well as by individuals mean what their consequences are, it is scarcely possible to conceive of a system of social organization where the prospective outcomes are not appraised somewhat by the actors. And fundamentally we do not appear able to escape reliance finally on the efficacy of education to persuade people to the significance of their own actions.

Perhaps the issues may be made more explicit by references to general value theory; while the exploration of this field is usually left to philosophers, economists cannot avoid taking some implied position on value theory if they take any stand on the issues of public policy. At one extreme is the position that desires and interests are themselves the sole criterion of the good; at the other is what may be termed the rationalistic, wherein the conceptions of good are integrated into a hierarchy of values.

The position that desires and interests are the standard of goodness states in generalized terms the position of those who believe that "anything the farmer wants is all right," or that "farmers should decide what they want and go after it." Such a position, both in the particular reference to farmers' desires and in the general statement, implies that values are merely subjective and that force is the method of value realization. It has the merit of recognizing both conflicts and the reality of power, but if followed consistently would involve us all in a power struggle to the bitter end of sheer domination of the weaker by the stronger. Our age is terribly impressed by the possibilities of power politics, yet there is little chance, if we were to embark upon such a policy, wholesale, that farmers could avoid being crushed and defeated. We are now one-fourth the population and may presently be a much smaller minority.

The rationalistic conception of the good appears to be taken by those who formulate the issues of policy solely in terms of conceptions of perfect competition. While this position has the weight of authority, and represents the essence of the historic liberalism of the western world, it leaves one in the position of knowing where we should come out rather than what to do next in the world as it is. If competition were perfect, resources perfectly mobile, power monopolized wholly by the government, and so on, it might be that the market would be the perfect regulator, that each man

would get what he earned and earn what he got, that there would be no unemployment, and physical welfare would be maximized. Yet, the issue is not over whether a politico-economic order would be good if it were so constructed, for such concepts are conceived as the ideals of policy, not a description of existence. Rather the issue rests on the question of whether this method of policy definition is adequate. If conflicts of interest are as real, and pressure groups as indigenous to our whole economic system as this essay implies, then how can we resolve our difficulties by apprehending the import of and conforming to such an ideal system?

While no one would care to be dogmatic on such a profoundly important issue, the crux of the difficulty appears to us to root in the separation of ends from means in our policy analysis. But the means must also be a sort of end for policy considerations. Perhaps it would be better to say that what we need is to formulate ends-in-view, to use one of Dewey's phrases,[11] which can serve both as an immediate goal and yet take us in the direction of the larger ends. The imperative is not to forget that efficient utilization of resources is of value to the human enterprise, but rather that we formulate principles of social valuation and social action that will both guide us in resolving day-by-day difficulties and yet lead us in the direction of the larger goals of a civilized people.

Many examples might be cited of the way the procedures of social intercourse have been modified with a weather eye to the relation of the eventual outcome to broad policy considerations. The arrangements between landlord and tenant may lead naturally either to exploitation or the improvement of resources. The substitution of economic penalties for the usual legal prosecution led to the attainment of industrial safety, to the gain of all concerned. Some of our co-workers have been unusually ingenious in conceiving possible concessions and adjustments on the federally regulated milk markets which both resolved the controversies of the moment and led to freer and more orderly markets.

In general terms this requires a theory of the structure of social action that shall have as an integral part a theory of social valuation. Stated in terms of the social aspects of agriculture, this would imply that we study especially collective action among farmers,

[11] See, for example, his discussion of the Continuum of ends-means in, The theory of valuation, published by the Chicago Press as No. 4, of Vol. 2, Foundations of the Unity of Science.

and conflicts of interest among farmers and between farmers and other groups; and such studies should be directed toward the end of discovering the ways in which differences were resolved to pave the way for mutually beneficial conjoint action. Such studies are needed to supplement, rather than to supplant existing analyses. Farmers and perhaps most agricultural economists must of necessity fix their attention on the net economic position of the farm as a business concern. The suggestion here is that we need to recognize and to analyze the way the freedom to operate such concerns is socially created and maintained. What we need to recognize is that these social roles within which our private affairs are managed are not set off by some immutable social "framework." These social roles are created by stabilized social behavior. They are, literally, the way we behave socially. The need is to understand the nature of both private and social action in such a way as to see the fundamental achieved unity of the whole.

VI

The need for investigating social action among farmers and formulating the implicit value principles may be illustrated by the case of allotments and quotas in the current adjustment farm program. The market quotas have the most coercion in them and are invoked only by the sanction of two-thirds of the farmers engaged in the commercial production of designated basic crops. Their purpose is to ration out a limited market among the farmers who are by definition entitled to it. The adjudged necessity for such rationing roots in the shrinkage of a market—to the point where it will not absorb the prospectively available supply at reasonable prices. That this is a major step away from our previously established social practices is obvious; yet some of the issues which it presents for social organization may have been submerged and neglected.

Emphasis upon the procedures by which the rationing is achieved reminds us that we are not only attempting to keep total production within designated limits but that we are also in the process of working out ways to ration limited economic opportunities among farmers. In terms of historical perspective this resort to quotas and rationing represents a reversion to a more primitive form of social organization. Rationing implies an authoritative superior, allocating burdens and benefits to persons in inferior (legal) positions.

Long before the rise of the enterprise system which we call capitalism, the opportunities for livelihood and advancement were dispensed in some such fashion. But with the development of free markets and the correlative enterprises, a liberty-exposure relationship between entrepreneur and the market was generalized. As noted above, conflicts between persons in the market were settled and social behavior stabilized by such principles as "a willing buyer and a willing seller." The effect was to develop an economic system with a wide degree of freedom.

Are we not faced with a task of great magnitude in working out the rules so that a farmer may have both security and justice, if the rationing of farm economic opportunities continues? Where is the equivalent to the common law market principle of a willing sale? What recourse does a farmer have if he considers his allotments unfair? Evidently if a farmer is dissatisfied with his allotments he may appeal through the various committees, local and state; as a final resort he might have standing in a court of equity, for example. But the point here is not so much to analyze the working rules of agricultural adjustment as to call attention to them as a social problem which illustrates the crucial importance of methods of selling disputes.

The degree to which they are a problem depends upon the extent to which agricultural adjustment programs actually modify the alternatives of the coöperators as compared with those on the outside. In turn, the degree to which programs modify the alternatives depends upon the conditions of the industry as a whole. But where marketing quotas are used in conjunction with the price pegging loan features, the size of the allotment may make the difference between financial success and failure.

This is not to say that all attempts at rationing have been a mistake. Should most of the world become completely dominated by totalitarian social systems as an aftermath of the present war, or be divided into great economic blocks, or if our farmers be faced with permanently curtailed or rationed total export markets, for whatever reason, then the recent experience in rationing economic opportunities might be one of the most valuable attainments of agricultural adjustment. And if external circumstances do not require its continuance, there is the possibility that farm organizations might attempt to use them as a method of augmenting their incomes.

In any case rationing is here, and one already hears remarks about the way the size of the allotment influences the value of the farm. Or farmers with similar farms find themselves with different corn bases, for example. The realization that such social arrangements have something approaching careers of their own, and the possibilities of attempts to use rationing devices much more vigorously both combine to suggest the significance of stabilized and equitable procedures in making allotments.

It is when one attempts to visualize the long time continuance of such rationing that the significance of ways of settling disputes becomes more apparent. For a short while a "historical" base would work tolerably well: this is settling disputes by the familiar rule of first come, first served. But already we are moving more in the direction of local flexibility and autonomy, with less emphasis on the history of the farm. Where this may lead eventually certainly poses a problem. As a long time program local flexibility has many advantages. But any considerable degree of local discretion runs the risk of throwing too great a strain upon the moral fabric of communities. A shift from the long standing practice of resolving differences through the market place to a possible arrangement whereby the economic welfare of a farmer is in the hands of a committee of his neighbors surely holds the possibilities of strife. Although the working rules by which such adjustments might be made would seem eventually to offer a challenge to research and ingenuity in any community, it would be in areas where considerable shifts in type of farming were desirable, or which were socially stratified that the need would likely be critical.

These remarks may be sufficient to show the strategic importance of methods of settling disputes. In the degree to which we rely on rationing we seem to be pulling the locus of conflicts from a zone of stabilized long-standing arrangements out into a new arena. We have had hundreds of years of experience in the development of the working rules of the market place. That those who went before us succeeded well is testified to by the smooth way transactions are carried out and to the infrequency of lawsuits among rural neighbors. Can equally good working rules be devised for a method of settling differences in the rationing of economic opportunities among farmers?

* * *

To summarize the argument, it has been suggested that the

structural changes in the economy deriving from the development of large-scale urban industry have had the effect of both developing large power groups and the drawing of the national government into the economy in a more active fashion. The emergence of these programs and group activities appears to call for a study of conflicts of interest as new adjustments are being worked out. Evidently the previously established order has achieved a workable resolution of the inherent conflicts, but the working rules by which this security and order were attained now need supplementing to fit the new circumstances. If conflicts of interest between persons and groups are a natural part of social behavior, then social analysis must investigate them and proposals for social direction be formulated in terms relevant to the achievement of orderly social intercourse out of conflict. Failure to recognize the fundamental role of conflicts courts the risk either of considering all attempts by interest groups to improve their status as fundamentally bad and deserving subjugation, or of formulating policy proposals in ways which are apprehensible as ideals but cannot function as principles in the settlement of differences between free men.

Received September 22, 1941

TRAINING OF PERSONNEL FOR THE RURAL SOCIAL SCIENCES

M. R. BENEDICT
University of California

THE RURAL social sciences are producing many able technicians and a good sprinkling of administrative officials. One may question, however, if we are doing as well as we might in developing broad visioned, philosophically minded leaders who can provide wise guidance in these difficult times. In both realms there is need for self-examination and constructive planning. In part we lack also well developed materials for training. The preparation of adequate basic works in the rural social sciences still leaves much to be desired. Perhaps it is too early for that since we are only now spinning some of the threads that may later be woven into a fabric with a consistent pattern.

In the recent report by Schultz and Witt on Training and Recruiting of Personnel in the Rural Social Studies,[1] this subject is opened up in a suggestive way. Their findings warrant serious consideration by those who are training personnel and by administrators concerned with strengthening education and service in the social science fields. The report should, however, be regarded as an opener of the subject rather than as a summary of settled conclusions. While the first section of the volume is given over to a synopsis of findings and recommendations, many of these will require wider and deeper study if they are to afford an adequate basis for a broad general program of improvement. In the meantime it is to be hoped that the emphasis given to the various problems will lead institutions and agencies to study and improve their practices on an individual basis. Much to be desired is a positive effort on the part of the various institutions to experiment boldly in an effort to overcome weaknesses that are clearly evident, and to build into the program new contributions and features, the lack of which is not even recognized at the present time.

Few students of the rural social sciences have arrived at anything like a thoughtful and balanced outlook on the problems we now see before us or on ways of approaching the research and educational

[1] Training and recruiting of personnel in the rural social studies,—a report prepared for the Committee on Rural Social Studies of the American Council on Education, by Theodore W. Schultz assisted by Lawrence W. Witt, American Council on Education, Washington, 1941. 340 p. $3.00.

problems arising out of them. Many are torn between loyalties to the farm group and a desire for broader social objectives. Others acquire a loyalty to a given approach whether through farm management, land economics, planned economy, price analysis, or what not, which amounts almost to an obsession. Running through these attitudes is an unconscious egoism which finds satisfaction in glorifying and expanding some particular subfield of subject matter. Whatever the cause, attitudes of this kind detract from a truly scholarly approach to the many-sided problems with which we are now confronted.

It is against this background that the problem of training personnel must be considered. We are confronted with problems both of what to teach and how to teach it. Both of these must be thought of in terms of the service to be performed by the trainee and of the time and effort he can afford to put into preparation and subsequent growth. They should not be thought of merely in terms of what the procurement officers now desire. All too often their conception of their needs is yet too limited. We should think of the discipline rather as a rankly grown young sapling which should now thrust its roots deeper into the soil of human knowledge, and reach up to new forms and broader usefulness. This means for some of the workers of the future more understanding of history, of psychology, political science, and anthropology. This is not to deprecate the need for better training in statistics, mathematics, and economic principles now so widely stressed, but rather to emphasize the broad scholarship and understanding of human institutions which some segments of the personnel must have if the rural social sciences are to meet their responsibilities to the public and achieve a respected place in the world of science and scholarship. We are clearly drifting toward more positive planning but in general we don't know enough about what we are planning for. To put the matter in another form, one may ask, are we on the way to having in the next ten years even a few great basic works suited to high-grade teaching in the rural social science fields? The subject matter for teaching both at the undergraduate and graduate levels is all too frequently fragmentary, poorly organized, and lacking in rigorousness. This may be one reason for the popularity of courses in statistics, in price analysis, and in mathematical economics. Here at least is something specific and precise for the student to seize upon, even if the precision is often apparent rather than real.

It is in the absence of much discussion of how to train and what to train for that one finds the report somewhat disappointing. It gives more attention to those things which lend themselves to statistical treatment than to qualitative aspects which are admittedly more difficult. It does provide a considerable body of factual material which is suggestive, especially with respect to administrative problems even though it rests in many cases on the data for a single year. Stress is very appropriately placed upon such problems as the excessive turnover of personnel in the South and in the Plains and Mountain states, on the tendency for departments to inbreed, on the appointment policies of the federal agencies, and on the methods of recruiting trainees. Inferences drawn from some of the rather mechanical tabulations are somewhat unsatisfying. Also one finds less in the way of proposals for dealing with the various problems than might be expected. Readers of the report should certainly not confine themselves to the synopsis presented in the first twenty-eight pages. Much more stimulating lines of thought arise from a reading of the main body of the report.

Many of the conclusions drawn will find ready acceptance and little is to be gained by detailing them here. Attention will be drawn more largely therefore to controversial aspects and to questions suggested by the reading of the report. Space is not adequate here for developing these in a comprehensive way. Since the committee of the American Farm Economic Association which has this problem in hand will deal with it in one of the sessions at New York, the report will undoubtedly have fuller review at that time.

As an example of the type of problem that needs wider discussion and fuller consideration we may take such a section as that on undergraduate recruitment which begins on page 100. The authors first point out that few of the students concentrating in the rural social sciences as undergraduates enter graduate training. They quote Patton and Lininger with apparent approval in their comments that the undergraduate work in agricultural economics should be oriented largely toward rank and file general training rather than specialization. Yet the tone of the section following page 103 implies the opposite conclusion. It is time we asked ourselves frankly, what is the real purpose of an undergraduate major in agricultural economics? There is general recognition that effective professional work in the rural social sciences requires graduate

training. A good case could also be made for the proposition that a graduate student with an undergraduate major, other than rural social science, given an opportunity to make up certain prerequisites, may come to the end of his training period fully as well equipped as one who majored in the field as an undergraduate. Many students who turn to the agricultural economics major do so as an escape from unwarrantedly specialized curricula in the other fields. They want courses in marketing, credit, farm management, and policy. This does not mean, however, that they intend to become agricultural economists. They are planning to be farmers, farm advisors, Smith-Hughes teachers, etc. In the usual undergraduate curriculum in agricultural economics they are as effectively shut out of necessary training in technical courses as are the husbandry and science majors from economics courses. In other words the divisions of agricultural economics are falling into the same error as are the technical divisions which set up narrowly restrictive curricula.

If the undergraduate major in agricultural economics has a place, it is apparently that of meeting the needs of the student who plans to farm or to enter some rather general type of agricultural activity. For this purpose it should provide for a well-rounded training in the technical fields as well as in the social sciences, and possibly should be called a general course, not an agricultural economics major. The high school instructor or farm advisor with many courses in the social sciences and little knowledge of technical agriculture is likely to be even more handicapped than he who has the reverse emphasis.

The figures on numbers of top-rank students in the various fields mean comparatively little. In the first place these are only for one year, and with such small numbers even one or two students may change the figures significantly for any particular institution. Also there is no showing of the relative numbers registered in the various curricula. It is probable, however, that the agricultural economics curricula do not graduate as many high-ranking seniors as do some others. It is possible that the reasons are different from those mentioned. In most colleges, students do not get applied social science courses until the junior and senior years. Their contacts are usually made in the technical fields much earlier and there is some tendency to tie the better students into those divisions through work assignments, intimate contacts, and otherwise. There would seem to be

no serious objection to this if the technical divisions did not maintain highly restrictive curricula which preclude reasonable access to social science and other more general courses. In other cases, as for example at California, most of the technical divisions are on a different campus and students must break their established ties to major in the social sciences.

Most students do not enter college with the social science major in mind. This is an interest that is likely to arise later, but the easiest and most natural transition may come after taking the bachelor's degree. Considerable thought should be given to means of facilitating such shifts where good students desire to make them. Also it seems to this reviewer that the report gives too much emphasis to the need for an undergraduate training in agriculture as a basis for graduate training in the rural social sciences. Certainly an intimate knowledge of agriculture and a sympathetic concern with its problems are necessary. Yet a rather general preparatory course may in many cases prove a better foundation for the graduate program. For illustration, the well-known triumvirate, Nourse, Black, and Davis, are a case in point. Many other familiar names of people who certainly do not rank at the bottom in the effectiveness of their contribution could be mentioned.

Few students arrive at a clear-cut plan for pursuing graduate work early in the undergraduate period. Those who do may not be the ones most to be desired as graduate material. It would seem therefore that instructors should make more effort to uncover and interest good graduate material at an earlier stage and then give more guidance in the selection of courses even if this requires breaking away from formalized curricula. At best, however, neither instructor nor student will know in most cases until the senior year whether the student is going to undertake professional training. The practical solution appears therefore to lie in encouraging or even requiring all good students to take certain much needed preparatory courses and, secondly, to work out better arrangements whereby beginning graduate students may pick up needed preparatory training perhaps with less input of time than is required in the usual undergraduate courses.

There are many other aspects of the report which tempt the reviewer to comments. Only one or two will be mentioned. The report discusses the very real problem of the low ceilings on salaries in areas which have admittedly some of the most complex and difficult

social science problems. In some measure this situation is administratively correctible though not without difficulty and distress for the administrator. Considerable amounts of federal funds flow into these institutions. These might be used to employ fewer people at higher salaries rather than the present numbers at low salaries. The stumbling block is, of course, the relation of these salaries to those of other staff members employed on state funds. In some cases legislative restrictions have been applied as well. It would seem, however, that the possibilities of revised policies on the part of the Office of experiment Stations might well be explored with regard to this problem. As an alternative the feasibility of a more regionalized organization of the federally supported research, as hinted at in the Schultz report, might warrant considerable study.

Many parts of the section on recruitment of graduate students afford an opening for further fruitful discussion and study. In a few places the comments seem somewhat too sweeping, as, for example, on page 141, the statement that "Not a single department to our knowledge has developed any scheme of examinations and interviews to ascertain comparative merits of the candidates from whom they select their graduate timber." Granting that existing procedures leave much to be desired, and that real study should be given to this problem, the situation seems not so undeveloped as this statement implies. This writer can recall many hours spent in staff discussions on how to select trainees, in careful review of transcripts of grades and supporting letters, and in personal interviews where these were practical. No doubt many others have similar experience. The problem is not solved, but it is not untouched.

In conclusion we may say that this report has opened up the subject. It has given us a good deal of useful factual material. We need now to give these problems fuller discussion and, where possible, to subject tentative conclusions to more rigorous study in terms of actual results. The American Council on Education and Dr. Schultz are to be congratulated for initiating consideration of the problem. The next step rests with the profession and the administrators concerned with its improvement.

RECEIVED SEPTEMBER 25, 1941

ECONOMICS OF JOINT COSTS IN AGRICULTURE*

S. v. Ciriacy-Wantrup†
University of California

THE ECONOMICS of joint costs in agriculture may be studied in two ways. The economic behavior of numerous farms sufficiently different with respect to problems of joint production may be studied statistically or the economics of joint costs may be studied analytically for a representative farm—in the Marshallian sense. It is almost commonplace to say that induction and deduction have to work hand in hand in agricultural economics as elsewhere in scientific pursuits. In themselves useful, statistical investigations of the mass behavior of farms have become dominant in modern agricultural economics. Significance of their results, however, often suffers from a lack of theoretical analyses of the economics of the individual farm. It seemed justified, therefore, to confine this study to the latter.

A few paragraphs or, less frequently, a whole chapter is devoted to the economics of joint production in most texts on economic theory; but few studies go beyond the rather elementary textbook level.[1] Thus far they have had little influence upon the thinking in agricultural economics. The objective here is to narrow this gap between agricultural economics and some recent developments of general cost theory, and to treat more minutely certain aspects of joint costs that have been overlooked or discussed only in passing. The more theoretical first and third sections are applicable with slight modifications to agriculture as well as other industries in which problems of joint production occur.[2] Although the remaining

* Giannini Foundation Paper No. 99.

† The author acknowledges gratefully the criticisms by his colleagues M. R. Benedict, H. E. Erdman, Sidney Hoos, and George Kuznets.

[1] Among these studies may be mentioned:

Marco Fanno, Contributo alla teoria dell'offerta a costi congiunti. Supplemento al Giornale degli Economisti, Ottobre, 1914. 143 p. Rome.

T. J. Kreps, Joint costs in the chemical industry. Quart. Jour. Econ., 44(3): 416–461. May, 1930.

H. von Stackelberg, Grundlagen einer reinen Kostentheorie, pp. 53–73. Wien, 1932.

Sune Carlson, A study on the pure theory of production, pp. 74–102. P. S. King and Son, Ltd., London. 1939.

[2] The economics of joint production are, generally speaking, of greater importance in agriculture than in nonagricultural industries for reasons which will become apparent later; but there are sections of agriculture in which joint production is of no importance and nonagricultural industries in which the problems of joint production are vital.

sections are written mainly for agricultural economists, it is hoped that others will find here and there a morsel worth their interest and criticism.

1. *Concepts Needed*

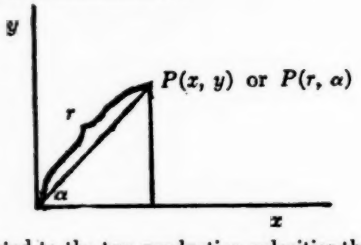
The problem of joint production can be discussed most conveniently and—as will appear later—satisfactorily from the standpoint of theory and of practical significance, if the study is confined to "instantaneous" production. In the following, therefore, production is always interpreted as rate of production. It will be called "production velocity."[3] On individual farms a combination of production velocities of different products is taken as synonymous with a combination of farm branches.[4] The result of a combination of production velocities of different products will be called a "product vector." The "components" of the product vector are the production velocities of the individual products. In order to express the product vector in quantitative terms individual production velocities must be measured in comparable units.

The product vector is defined through its "direction" and its "length."[5] The direction indicates the proportion between its components, that is, between the farm branches. The length refers to

[3] Production velocity is the first derivative of production as a function of time. The term "production velocity" is more convenient than the term "rate of production" because the term "rate" can thereby be reserved for problems in which rates of change of production velocity, that is, the second derivative of production as a function of time, are under consideration.

[4] The term "farm branch" or, for short, "branch" is used here because the term "farm enterprise" or "enterprise" which is commonly used in farm-management studies in the United States is too general for our purposes. A "farm enterprise" may be composed of different branches. As stated in the text, branches are differentiated on the basis of products produced. The sheep "enterprise," for instance, may be composed of a wool branch, a mutton branch, and a milk branch. Furthermore the term "enterprise" gives rise to confusion because in economic theory the term "enterprise" is used to indicate the whole concern of the entrepreneur and not individual departments.

[5] The concepts of direction and length may be clarified through reference to the familiar system of polar coordinates. If x and y are two production velocities of the product vector, this may be illustrated by:



The direction α is related to the two production velocities through $\text{tg}\ \alpha = y/x$. The length r is determined by $r = \sqrt{x^2+y^2}$. For further discussion of the concepts, compare the excellent study of Stackelberg (*op. cit.*, particularly p. 55).

the combined volume of the components, that is, to the rate of output of the whole farm. In economics the concepts of the product vector, direction and length, are useful mainly because they afford short but concise expressions of complex relations. The possibility that economic product vectors are susceptible to all operations of vector analysis is implicitly included. These operations, however, such as addition and multiplication of different product vectors, have little significance for this study, and the usefulness of the concepts as "shorthand" expressions in the theory of joint production would not suffer if some operations of vector analysis could not be performed.

We may now ask what kind of relations exist between the components of a product vector. These relations may be defined through use of the total or the marginal net revenue, revenue, and cost functions. Each of the two methods of definition has advantages and disadvantages for our purpose.

If the total functions are used, we may say that joint production will take place if total net revenues from joint production are greater than total net revenues from separate production; the former may be greater than the latter because total revenues are greater or total costs are less or both.[6] It may be emphasized that the relations considered here are those in the production plan of individual producers. Products may be produced separately but they may be related in the supply and demand for the market as a whole. Products having a separate production plan, though nominally produced by the same concern, are economically separate products. The above relation is a necessary and sufficient condition for joint production, provided that net revenues of joint and separate production are compared for identical production velocities for each individual product. Joint production is often economical only for certain ranges of production velocities.

The relations just described may be used for differentiating between complementarity, competitiveness, and independence of products in *total* net revenues, revenues, and costs. Two products are complementary, competitive, or independent in total net revenues if these revenues from joint production are respectively larger, smaller, or equal to total net revenues in separate production; complementarity, competitiveness, and independence of two products in total revenues and in total costs may be defined *mutatis mutandis*

[6] If x and y stand for production velocities of two products X and Y, V for net revenues, R for revenues and Q for costs, this may be written
$V(x, y) > V(x, o) + V(o, y)$; $R(x, y) > R(x, o) + R(o, y)$; $Q(x, y) < Q(x, o) + Q(o, y)$.

in similar fashion. It is always to be remembered that products may be complementary, competitive, and independent for different production velocities and that the differentiation applies to individual firms and not to the "industry." Complementarity in total net revenues is a necessary and sufficient condition for joint production. Complementarity either in total revenues or in total costs is a necessary, but not a sufficient, condition.

Use of the total functions for defining complementarity, competitiveness, and independence has the advantage that conditions are established which determine whether it is economical to combine given production velocities of different products to a product vector or to leave them separate, or whether a choice between joint or separate production is economically irrelevant. The disadvantage of this definition is that nothing is said about the relation of the marginal units of one product to those of joint products. Clearly, if complementarity of total net revenues and, therefore, joint production exists, marginal units of different products have increased each other's marginal net revenues more than they have decreased them, over the whole range of production velocities; but an additional unit of one product may leave marginal net revenues from joint products unchanged or decrease them. Even in the latter case it may be profitable to produce the additional unit because the increase in net revenues from this product may be larger than the decrease in net revenues from joint products. However, in this case, the effect upon the production velocities of joint products and thereby upon the direction of the product vector is quite different from cases in which production of an additional unit of one product increases also marginal net revenues from joint products. For many problems in the economics of joint production, therefore, the relation between the components of a product vector can be more significantly described through use of the marginal net revenue, revenue, and cost functions. We may say then that two products are complementary, competitive, and independent in *marginal* net revenues if a (small) increment in one product increases, decreases, or leaves unchanged the marginal net revenues of the other product; complementarity, competitiveness, and independence of two products in marginal revenues and in marginal costs may be defined *mutatis mutandis* in similar fashion.[7]

[7] This may be expressed through use of the second "cross" derivative of the three functions. Using the same symbols as above, complementarity, competitive-

The latter definitions have the advantage that they are well adapted to thinking in terms of revenue and cost surfaces. This is convenient if the relation of changes in the production velocity of one component to changes in the production velocity of other components is considered. More will be said about this when the determination of the optimum product vector is discussed. A further advantage of the use of second cross derivatives for defining complementarity, competitiveness, and independence is their general applicability. They can be used as conveniently for defining the relations between market demands and market supplies as for defining the relations between the components of product vectors of individual firms.[8] For the two former purposes use of the total functions in the way discussed above is meaningless except under pure monopoly if the products considered are produced by the same monopolist. Care, however, should always be taken to state clearly with respect to what functions the second cross derivatives are taken. The main disadvantage of defining complementarity, competitiveness, and independence on the margin is that these definitions do not establish conditions for joint production. Two products may be complementary in marginal net revenues but joint production may not be economical for the production velocities to which the "cross" derivative applies. Two products may be competitive in marginal net revenues from certain production velocities onward but joint production will continue for a certain range of production velocities although an increase in the production velocity of one product will cause a decrease in the production velocity of the other product. Conditions for joint and separate production on individual farms can only be established through use of total

---

ness and independence in marginal net revenues may be expressed by

$$\frac{\partial^2 V}{\partial x \partial y} > 0; \quad \frac{\partial^2 V}{\partial x \partial y} < 0; \quad \frac{\partial^2 V}{\partial x \partial y} = 0;$$

in marginal revenues by

$$\frac{\partial^2 R}{\partial x \partial y} > 0; \quad \frac{\partial^2 R}{\partial x \partial y} < 0; \quad \frac{\partial^2 R}{\partial x \partial y} = 0;$$

and in marginal costs by

$$\frac{\partial^2 Q}{\partial x \partial y} < 0; \quad \frac{\partial^2 Q}{\partial x \partial y} > 0; \quad \frac{\partial^2 Q}{\partial x \partial y} = 0.$$

[8] To mention only a few authors, they are used by Pareto, Edgeworth, Stackelberg, Hicks, R. G. D. Allen, Henry Schultz, Carlson, and many others.

and not of marginal functions. The two sets of concepts of complementarity, competitiveness, and independence must not be confused.

Under perfect competition, revenues can have no influence upon the choice between joint and separate production. Marginal revenue, that is, market price, cannot be affected by the actions of an individual farmer who changes his product vector. In other words, marginal revenue remains constant whether the farmer varies production velocities or changes from separate to joint production. If marginal revenue remains constant, average revenue must remain constant also. If average revenue remains constant, total revenue cannot be influenced either, because, as already emphasized, the comparison between the economics of joint and separate production must be made for identical production velocities. Complementarity and competitiveness of revenues are impossible. All branches are independent in revenue. This holds whether the individual farm is in equilibrium or not. In agriculture, where perfect competition can be assumed to prevail, complementarity and competitiveness in (total and marginal) revenues can, therefore, be neglected in a discussion of joint production. It may be noted that complementarity and competitiveness in market demands which occur frequently among agricultural products are *conditio sine qua non* for complementarity and competitiveness in revenues for individual farms, but that complementarity and competitiveness in the former may exist without complementarity and competitiveness in the latter. Only under pure monopoly are complementarity in revenues and in demands necessarily synonymous. Definition and measurement of complementarity, competitiveness, and independence in demands for agricultural products have been treated recently by Schultz and others.[9] Since they are of only secondary interest here, further references to relations of demands can be omitted.

If branches can be regarded as independent in revenues, attention can be concentrated on the economics of joint costs. Here also a differentiation has to be made between complementarity and competitiveness in (total and marginal) costs for individual farms and in market supplies. Complementarity and competitiveness in

[9] Cf. Henry Schultz, The theory and measurement of demand. University of Chicago Press, 1938. Also, J. R. Hicks, Value and capital. Chaps. 3 and 7. Oxford, 1939. Irving Fisher, Mathematical investigations in the theory of value and prices. Transactions of the Connecticut Academy of Arts and Sciences. 9: 76–85. New Haven, 1892.

marginal costs are *conditio sine qua non* for complementarity and competitiveness in market supplies, but the former may well exist without the latter. Only under pure monopoly do the two concepts become synonymous.[10]

Complementarity, competitiveness, and independence in costs thus far refer to the aggregate effect of complementarity, competitiveness, and independence in the costs of all individual productive factors.[11] Products may be competitive in the costs of some productive factors; but complementarity in the costs of other productive factors may outweigh this and make joint production economical. On the other hand, products may be complementary in the costs of some factors, but joint production may not be economical because of competitiveness in the costs of other factors. Complementarity, competitiveness, and independence in total and marginal costs of some or only one productive factor may be defined in the same way as complementarity, competitiveness, and independence in total and marginal costs of all factors.[12] This assumes that costs of individual productive factors are functions of the product vector. Prices of productive factors are not necessarily assumed constant, but related exclusively to changes of the product vector; under perfect competition, of course, changes of the product vector do not affect prices. Here again the same products may be complementary, competitive, and independent in the (total and marginal) costs of individual factors at different production velocities, and complementarity, competitiveness, and independence of products in the costs of individual factors on individual farms must clearly be differentiated from complementarity, competitiveness, and independence of products in the costs of individual factors considering the economy as a whole.

---

[10] This is not pointed out clearly enough by Carlson (*op. cit.*, chapter 5).

[11] The term "productive factor" may be used in the sense of "flow of productive services" or of "stock of productive services." In instantaneous production the former is meant. This is important in the case of durable factors. Only the services of these factors appear in the production function.

[12] If v stands for the total costs of an individual productive factor, products will be complementary in total costs of this factor if $v(x, y) < v(x, o) + v(o, y)$; they will be competitive if $v(x, y) > v(x, o) + v(o, y)$. They will be independent if $v(x, y) = v(x, o) + v(o, y)$. Products will be complementary in the marginal costs of this factor if $\frac{\partial^2 v}{\partial x \partial y} < 0$; they will be competitive if $\frac{\partial^2 v}{\partial x \partial y} > 0$; they will be independent if $\frac{\partial^2 v}{\partial x \partial y} = 0$.

To treat costs of individual productive factors exclusively as functions of the product vector may seem to offer difficulties because physical inputs of individual productive factors are not only a function of the product vector but of the inputs of all other productive factors. It must be shown, therefore, why physical inputs of individual productive factors can be regarded as functions of the product vector.

Physical inputs of individual productive factors, their technical relation to the product vector, and their technical relation among themselves—they do not need to be independent—are given by the production function and the "side relations" to which this function may be subject.[13] The concept of a cost function implies that productive factors are combined in such a way that—subject to the production function—each product vector is realized with minimum total costs. Minimum total costs are obtained by varying productive factors until the familiar necessary condition prevails that the marginal physical productivities of different factors are proportional to their marginal unit costs—that is, proportional to their prices, if the supply is perfectly elastic for individual farms.[14]

---

[13] If x, y and z are production velocities composing a product vector and $v_1, v_2, v_3, v_4 \cdots v_n$ individual productive factors, the production function may be written $F(x, y, z, v_1, v_2, v_3, v_4 \cdots v_n)=0$. The production function may be written in explicit form for any one production velocity composing the product vector; for instance, $x=f(y, z, v_1, v_2, v_3 \cdots v_n)$. For the product vector the production function may be written in explicit form $\xi(x, y, z)=f(v_1, v_2, v_3 \cdots v_n)$. It often happens that individual factors are not independent. The production function is then subject to one or more side relations $\psi_1(x, y, z, v_1, v_2, v_3 \cdots v_n)=0$; $\psi_2(x, y, z, v_1, v_2, v_3 \cdots v_n)=0$; $\psi_3(x, y, z, v_1, v_2, v_3 \cdots v_n)=0$; etc. Side relations appear often in the form of "boundary conditions." This means that the effective region of the production function is limited by the requirement that a minimum quantity of some factor has to be present in order to realize a certain production velocity regardless of the quantities of all other factors which may be added. In other words, the "right hand" marginal productivity of any factor is always zero if no quantity of such a "limitational" factor is added. Cf. A. Smithies, The Austrian theory of capital in relation to partial equilibrium theory. Quarterly Journal of Economics. 50 (1): 117–150, particularly p. 122 ff. November, 1935; and The boundaries of the production function and the utility function. In, Exploration in economics; Notes and essays contributed in honor of T. W. Taussig, pp. 326–335. New York, 1936.

[14] Considering a product vector composed of two production velocities x and y produced with two factors v_1 and v_2, the prices of which p_1 and p_2 are given, a highly condensed solution of finding the minimum total cost combination may be presented as follows: The cost function is $Q(x, y)=v_1p_1+v_2p_2$. The production function is $F(x, y, v_1, v_2)=0$. The problem is to find the minimum value for the cost function subject to the "side relation" $F(x, y, v_1, v_2)=0$. To indicate that x and y are given we write $q(x, y)=v_1p_1+v_2p_2$ and $\xi(x, y)=\phi(v_1, v_2)$. Taking v_2 as independent variable, the side relation is used to express v_1 in terms of v_2. Differentiating with respect to v_2 and equating to zero a value for v_2 is obtained which will give an extreme value for $q(x, y)$. Using the sign of the second derivative as test, the minimum value for v_2 is established. If more than two factors are involved, the solution becomes more

This concept of the cost function implies that there is only one combination of productive factors corresponding to each point on a cost curve. Solution of the minimum total cost combination for each product vector, therefore, allows us to regard physical inputs and costs of individual productive factors exclusively as functions of the product vector.[15]

---

complicated but the principle remains the same. The solution for the general case—through Lagrange multipliers—is discussed in advanced texts on calculus. Cf. R. G. D. Allen. Mathematical analysis for economists. London 1938, pp. 366 and 367 and references cited by Allen on p. 366.

It can easily be shown that the marginal physical productivities of the factors have to be proportional to their prices in the minimum cost combination. From the cost function we have

$$\frac{dq(x, y)}{dv_2} = p_1 \frac{dv_1}{dv_2} + p_2 = 0,$$

and from the side relation

$$d\xi = \frac{\partial \phi(v_1, v_2)}{\partial v_1} dv_1 + \frac{\partial \phi(v_1, v_2)}{\partial v_2} dv_2 = 0.$$

The latter may be written

$$\frac{dv_1}{dv_2} = - \frac{\dfrac{\partial \phi(v_1, v_2)}{\partial v_2}}{\dfrac{\partial \phi(v_1, v_2)}{\partial v_1}}$$

substituting we obtain:

$$\frac{p_1}{\dfrac{\partial \phi(v_1, v_2)}{\partial v_1}} = \frac{p_2}{\dfrac{\partial \phi(v_1, v_2)}{\partial v_2}}.$$

If only two productive factors are considered and no attention paid to the composition of the product vector and its components expressed in common terms, the indifference approach can be used. From two three-dimensional graphs—one presenting the cost function and the other the production function—a "contour map" of cost and production indifference curves can be obtained in a field, the coordinates of which represent quantities of the two productive factors. The minimum cost combination for a given product vector is then shown by the point of tangency of the given production indifference curve with the innermost cost indifference curve. This approach will be discussed below in more detail in another connection.

[15] If the minimum total cost combination for each product vector is solved we may write $v_1 = v_1(x, y)$ and $v_2(x, y)$. A function giving the minimum cost for a variable product vector may therefore be written $Q = v_1 p_1(x, y) + v_2 p_2(x, y) \cdots v_n p_n(x, y)$. This is our cost function $Q(x, y)$ if all factors are regarded as variable. Total minimum costs for different product vectors are usually obtained with different combinations of productive factors. This is true even if the proportion of production velocities composing the product vector is regarded as constant. Equiproportional variations of inputs of individual factors with variation of the product vector—if direction is kept constant—are rare. Changes in the combination of productive factors with variations of the product vectors represent, strictly speaking, changes in production methods. Whether or not such changes are called changes in the production function is a matter of terminology. The production function may be regarded as representing all production methods known at a given state of the arts. Changes in production methods may give rise to discontinuities in the cost function but do not affect the concept of a production function and a cost function.

It will appear that the concepts of complementary costs just developed are of greater significance in the economics of joint production than is the concept of joint costs. Total costs of joint production, or, for short, joint costs, are always complementary, provided that revenues are independent or competitive. But joint costs may be composed of complementary, competitive, and independent portions, according to the complementarity, competitiveness, and independence of productive factors. This is important for the allocation of joint costs (see section 4). The complementary portion of costs is significant in the economics of joint production, although this portion may not bring about joint production—in which case it would be impossible to speak of joint costs. Complementarity in costs is such a general phenomenon of production, particularly in agriculture, that nearly always choices between joint and separate production have to be made in determining the optimum product vector. Complementarity of total costs is of economic interest in spite of the fact that joint production may not be economical because of competitiveness in revenues.

2. *Jointness in Costs in Relation to Fixity in Costs*

A more detailed exploration of the dimensions and forms of fixities in productive factors and in costs, and an analysis of the significance of fixities in agriculture must be deferred to a subsequent article. A short sketch, however, of the relation between complementarity of costs and at least one important dimension of fixity, namely, fixed costs proper and lumpy costs,[16] may help to

[16] Fixed costs are those which do not vary at all with changes of production velocity over that range of production velocity which is investigated. They represent a constant positive quantum over the whole range of production velocity considered, and vary, therefore, per unit of product in the form of a rectangular hyperbola. They may be defined as costs of a zero product vector $Qc=Q(o, o)$.

Fixed costs are different from fixed charges. Fixed costs can be attributed to a certain use of factors of production regardless of property and other rights, and regardless of whether actual money or other transactions are involved to secure their use. Fixed charges, on the other hand, represent contractual obligations of an economic unit to make current payments regardless of the nature and origin of these payments.

Lumpy costs may be differentiated from fixed costs because, in many practical problems of cost analysis, costs of various "degrees" of fixity or variability occur simultaneously. Some costs are fixed over the whole range of production velocity considered (fixed costs). Others are fixed only over a part of the range. The latter vary as noticeable quanta, that is, discontinuously with variation of production velocity. These discontinously variable costs will be called lumpy costs. They may be represented by trigonometric series of the Fourier type. For our purposes it is sufficient to say that they appear as separate functions of the product vector in the total cost function: $Ql=Ql_1(x, y)+Ql_2(x, y)+Ql_3(x, y)\cdots+Ql_n(x, y)$.

clarify the theoretical discussion of jointness and point to its practical significance.

Fixity and jointness in costs are both deeply involved—although not always clearly recognized—in the perennial controversy about the problems of "diversification" and "size" in farming. Some scholars, for instance, expect that mechanization of agricultural production, particularly the increased use of large motorized units of planting and harvesting equipment for small grain, corn, cotton, and root and truck crops will decrease the degree of diversification by individual farms[17] and increase their size. Their argument is based largely on the economics of fixed and lumpy costs. Other scholars believe that the economics of joint costs in connection with fixity of size of farms will have a strong influence upon or even determine the forms of mechanization—in other words, that the agricultural-implement industry will be induced by the demand to furnish smaller and less specialized units of equipment. Both groups of scholars can point to recent economic changes in the agriculture of the United States and other countries which seem to prove their thesis. This contradiction is explained by differences in the importance of joint costs and by the relation between fixed and joint costs. What then is this relation between jointness, or better complementarity in the defined sense, and fixity in costs?

The technological cause of complementarity and fixity in costs is identical. It is the technical indivisibility of productive capacity. The general economic problem created by complementarity and

[17] Diversification by farms should not be confused with diversification by regions. Such a confusion is facilitated by the fact that interesting hybrids of diversification by farms and by regions occur.

Specialized farms may change their specialization in more or less regular intervals with a change of operator and with or without change of ownership. In California, for instance, some farms are rented for a number of years to specialized truck farmers until decrease of soil fertility and increase of soil-borne diseases make a change necessary. Then they are put into alfalfa by the owner or rented to a livestock farmer until soil conditions have been rectified. A similar "rotation" exists in the Argentine between livestock farming on large estancias undertaken by the owner and grain production entrusted to tenant farmers.

California also affords examples for the interrelation of specialization by farms and specialization by regions through the effect of large fixed equipment in the processing, transporting, and marketing of special agricultural products. This affects specialization by farms because many processing and marketing organizations are themselves engaged in farming. It may also affect specialization by regions because these organizations may find it to their advantage to induce farmers of a whole region to specialize in the production of raw materials and because farmers themselves through cooperation have considerable stakes in processing and marketing organizations. On the other hand, improved roads and increased efficiency of long distance trucking, which make collecting of relatively small lots from individual farms possible, work in favor of diversification.

fixity in cost is also identical. It is the utilization of unused productive capacity. The main difference is that unused productive capacity of complementary costs can only be utilized through diversification of the product vector, whereas unused productive capacity of fixed costs can only be utilized through increases in the components of the product vector. In the former case, the direction, in the latter the length of the product vector, is cause of economies. Another difference is that complementarity in costs is a phenomenon of the short as well as the long run, whereas fixity in costs is a phenomenon of the short run only. The technological conditions which cause a differentiation between complementary, competitive, and independent costs have potential economic relevance as long as the state of the arts remains unchanged, whereas technological conditions which cause a differentiation between fixed, lumpy, and variable costs have potential economic relevance only during the short run. For this reason conditions for the existence of complementary costs were formulated above without paying attention to the existence of fixity in costs. If complementary costs exist in the long run, they exist also in the short run and vice versa, provided that always the same product vector is considered.

These differences do by no means indicate that the existence of fixity in costs is immaterial for joint production. From the point of view of secular development, fixed costs are important for joint production because of their relation to production velocities.[18] The existence of complementary costs is, as we know, also closely related to production velocities. It is often held that an increase in fixed costs which tends to increase production velocities through the economies of size increases also the economic possibilities of joint production. The example of by-products is usually cited where increases in production velocities may indeed increase the economic possibilities of joint production and, vice versa, the economies of joint production may tend to keep production velocities on a higher level than would prevail under separate production.[19]

It is by no means generally true that the economic possibilities

[18] From the point of view of instantaneous choice between different product vectors, as in the determination of the optimum product vector discussed later, only those costs are considered which are functionally related to changes of the product vector. Fixed costs are not functionally related to changes of the product vector but appear as constants in the total cost function. They are therefore disregarded. This, of course, is in no way different in separate production.

[19] For instance: J. M. Clark, Studies in the economics of overhead costs, pp. 102 and 103. University of Chicago Press, 1923.

of joint production increase with increases in production velocities. In some cases complementary costs may change to independent or even competitive costs after a certain production velocity is reached, or, competitive costs may become more important relative to complementary costs with increasing production velocities. In agriculture both factors are important. This may be illustrated and the use of the concepts developed may be shown through an example.

Let us take the joint production of winter grain, root crops, summer grain, and legumes together with livestock in the famous Norfolk rotation. Assuming an increase in production velocities through increase in total acreage, through increase of intensity, or both, costs of soil conservation and soil amelioration will remain complementary in character and retain or increase their relative importance. Family labor costs will remain complementary but will become relatively less important with increasing production velocities because of absolute limits on the labor capacity of the family. Equipment costs will usually change from complementary to independent costs because simple, nonspecialized forms are replaced by specialized; for instance, harvesting equipment for grains and legumes becomes differentiated and root crops are not simply plowed out but harvested with special machines. Costs of hired labor may change from complementary to independent costs because it may become economical to employ specialized seasonal labor for harvesting grain and for planting and harvesting root crops. If seasonal labor peaks are reduced through the above changes in equipment or if seasonal labor is not available or too expensive, hired labor costs will remain complementary. Costs of supervision and management will change from complementary costs—when the time of one manager is not yet fully utilized—to independent or even competitive costs because specialists may be employed or a highly skilled general manager may be needed to keep a complex organization functioning properly. Internal transportation costs are from the beginning competitive. All four crops compete for location, for "situs," around the farmstead.[20] If production velocities are increased through expansion of acreage—which *ceteris paribus* is necessary at some point because of diminishing additional returns

[20] This competition for location with respect to the farmstead should not be confused with what is usually called "competition for land." It is assumed here that land, hired labor, and equipment are not limited to the individual farm operator and that his purchases do not affect prices.

per acre—these costs will soon prohibit further increases. Internal transportation costs increase with increasing production velocities at a higher ratio than most other costs.[21] By-products and livestock economy are such that the former can usually be fully utilized at the smallest practically occurring production velocities. Under these conditions increases in production velocities may not favor joint production. Similar conditions are not unusual in nonagricultural industries.

Additional conditions, however, may change the above picture. On heavy soils sugar beets, with high complementary costs of soil conservation and soil amelioration with respect to grains, can only be grown if enough power for deep plowing is available. If production velocities are not sufficient to make a team of four horses economical, as in many farms of central and eastern Europe, the introduction of sugar beets into the Norfolk rotation is difficult. An increase in size of farms through the economies of mechanization in grain growing, or simply the replacement of available horses by a tractor, may favor sugar-beet production. In contrast to the dairy and hog branches, sheep raising is not economical on a small scale. In intensive agriculture, as in our example, by-products that can more economically be utilized by sheep than by other kinds of livestock are not important per acre. The sheep branch, therefore, can add to diversification only on farms of large size. In areas of intensive agriculture and small farms, sheep branches have almost disappeared, whereas in areas of similar intensity, but large farms, for instance, in certain sugar-beet-growing areas of central Germany, sheep raising still holds its own. Increases in size of farms caused by mechanization will also favor sheep raising. Generally speaking, the economic utilization of by-products in agriculture does not require great production velocities because most by-products can be used by cattle, hogs, and poultry which in turn can be economically kept at very small production velocities per farm. Nevertheless, careful analysis of *all* effects of increases in fixed costs and of production velocities upon complementarity, competitiveness, and independence in costs is necessary before conclusions as to the effect upon joint production can be drawn. By and large the

[21] For a great number of geometric configurations of farm layouts the increase in these costs can be easily formulated in mathematical terms. Cf. Alexander Tschajanow, Die optimalen Betriebsgrössen in der Landwirtschaft, pp. 31–44. Berlin, 1930; and S. v. Ciriacy-Wantrup, Die zweckmässigen Betriebsgrössen in der Landwirtschaft der Vereinigten Staaten, pp. 97–103, Berlin, 1932.

incentive for joint production will be reduced. Costs of soil conservation and amelioration, however, remain complementary. The same is commonly true for hired-labor costs. In secular perspective, costs of soil conservation and amelioration tend to become relatively more important. This is of considerable importance for farm management in the United States, in many parts of which a depleting stage in land utilization is just passing.[22]

3. *Determination of the Optimum Product Vector*

The extent to which productive capacity of factors creating complementary costs is utilized through joint production is determined by the optimum product vector. Determination of the optimum product vector constitutes an economic problem not only in joint production but also for all conditions under which decisions between separate and joint production have to be made. Conditions that point unequivocally to separate production are an exception in agriculture. Separate production may therefore be looked upon as a special case of joint production, and the determination of optimum production velocity as a special case of the determination of the optimum product vector.

Little needs to be said here about the fundamental assumption underlying the determination of optimum product vector, namely, that maximization of net revenue is the goal of economic activity by individuals and groups. This assumption is the foundation stone of any rigorous treatment of production economics, and makes possible mathematical treatment on the basis of the theory of maxima and minima. The assumption is sufficiently realistic if the definition of costs and revenues—which of course must be measurable in comparable units—is appropriate for the problem considered.[23] Efforts devoted to discredit the "unrealistic" assumption of maximization of net revenue as the goal in economics may better be employed to develop concepts and yardsticks for use in those numerous cases in which "profits" are not the goal of economic activity and the textbook concept of "economic man" becomes

[22] Cf. S. v. Ciriacy-Wantrup, Land conservation in European farm management. JOUR. FARM ECON., 20(1): 86–101. 1938.

[23] A definition fitting a capitalistic economy in which "profits" are regarded as the goal of maximization and allocated to the services of the "entrepreneur" in making "new combinations" (Schumpeter) or "bearing risk and uncertainty" (Knight) may not be adequate for a peasant economy, a feudal economy, or a socialistic economy. However, the principle of maximization of net revenues can usefully be applied to the latter economic styles as well.

clearly inapplicable. In practical farm management, approximations to the goal of maximizing net revenue become necessary. These will be discussed later.

In joint production, marginal costs and revenues are expressed by partial derivatives with respect to the individual production velocities composing a product vector. If joint products are produced in invariable proportion the use of partial derivatives becomes meaningless and unnecessary. Joint costs of this kind present intriguing problems from the standpoint of price theory and of price policy by a monopolist,[24] but from the standpoint of determining the optimum product vector for individual firms under perfect competition they are of no interest. They may be regarded as costs of a single composite product. Joint costs with invariable proportion appear here and there in mining and in the chemical industry.[25] In agriculture they are rare. Nearly all crop and livestock branches can technically be combined in many desired proportions. Among these branches are beef and milk, wool and mutton, grain and straw, and others which are usually regarded as joint products with invariable proportion. Thus far only small variations have been accomplished in the proportion of a few joint products, for instance cotton and cottonseed, but even here variation through different practices seems biologically conceivable.

Often the variation in proportion takes time. There may also be choice between instantaneous variation and variation over time. In livestock farming the proportion of milk and beef produced may be changed instantaneously through selling beef cattle and purchasing dairy cattle. The proportion may also be changed through the slow process of breeding, namely, through crossing with other breeds or with different strains of the same breed and by selection within the herd itself. In a given herd the proportion may be changed through feeding and other practices, a process which becomes effective within a shorter time interval.

If the optimum product vector is to be determined over a num-

[24] Cf. Marshall R. Colberg: Monopoly prices under joint costs: fixed proportions. Jour. Pol. Econ., 49(1): 103–110. February 1941; and Raymond T. Bye, Composite demand and joint supply in relation to public utility rates. Quart. Jour. Econ. 44 (1): 40–62. November, 1929.

[25] The proportion of minerals in a given body of rock is not subject to control. In many chemical processes raw materials are split into products in fixed proportions. This is at least true for inorganic chemistry with which the chemical industry is mostly concerned. However, even in inorganic chemistry, not to mention organic chemistry, the proportion of many "splits" can be influenced to a considerable degree.

ber of instants, that is, if it is regarded as function of time, then costs, revenues, and net revenues for the whole period considered may be expressed as "functionals"—conveniently in the form of an integral over time. They are still functionally related to the product vector in each instant but this relationship may—and usually does—vary with time. Costs, revenues, and net revenues for the whole period are then dependent upon the course the product vector takes over time. If a variable changes with the shape of a variable function we speak of a functional.[26] The determination of the optimum product vector under these conditions becomes the basis for a just-emerging branch of economics which breaks loose from the artificial assumption of instantaneousness.[27] Its technique is that section of the theory of functionals known as the calculus of variations. Its use, however, would submerge the treatment of joint production under the complexities of "time economics." For this reason it will be assumed that the farmer compares alternative product vectors instantaneously at a stage when oscillations of costs and revenues incidental to a variation of product vector have disappeared. Thus, in the above example marginal costs of milk with the same production of beef, as well as the marginal costs of beef with the same production of milk, are compared with the prices of milk and beef received after the various farm-management measures mentioned have been completed, for instance, that breeding operations have resulted in a herd which produces milk and beef in the desired proportions. The production in the transition period and the length of this period enter, of course, into the calculations of the farmer, but this is not a problem of joint production.

In instantaneous production three theoretical approaches may be differentiated and compared with respect to their usefulness in agricultural economics. These are the marginal-cost, the marginal-productivity, and the indifference approaches.

[26] A functional should not be confused with a function of a function. In the latter concept it is assumed that the product vector is a definite function of time and that costs, revenues, and net revenues are, therefore, also definite functions of time. This does not fit our case. In the former concept it is assumed that the costs, revenues, and net revenues for the whole period considered depend on the particular shape of the function expressing the product vector as function of time. One value of revenues, costs, and net revenues is then associated with each whole function. Cf. Erich Schneider, Theorie der Produktion. Wien, 1934, p. 74; and G. G. D. Allen, *op. cit.*, chapter 20.

[27] Cf. the pioneering work of Harold Hotelling, The economics of exhaustible resources. Jour. Pol. Econ., 39(2): 137–175, particularly pp. 152–157. April, 1931. Also: A. Smithies, The maximization of profits over time with changing cost and demand functions. Econometrica, 7(4): 312–318. October, 1939.

The maximization of net revenue appears in its theoretically simplest form if cost and revenue functions are taken as a starting point. For this reason this approach is used in most textbooks.[28] The problem is the same as in separate production with the exception that the comparison of marginal costs and marginal revenues refers to *partial* derivatives.[29] The number of individual production velocities is theoretically immaterial. The number of equations (compare footnote 29) will always be equal to the number of unknowns, namely, the production velocities composing the optimum product vector. It is scarcely necessary to mention that fixed costs disappear in the process of obtaining partial derivatives. They cannot, therefore, affect the determination of the optimum product vector.

It is often more convenient to approach the optimum product vector not through comparing the derivatives of the combined total cost and revenue functions but through comparing the marginal costs of a unit of individual productive factors with the marginal value product of such a unit.[30] If prices of cost factors are given, we have as a necessary condition for optimum product vector the familiar requirement that productive factors will be employed until the marginal value product of a unit of each factor is equal to the price of that unit. This condition can be derived from the last-mentioned equations (compare footnote 29) because marginal costs for

[28] With respect to joint production, cf.: Alfred Marshall, Principles of economics, p. 390 ff. 8th ed. London, 1927. And H. D. Henderson, Supply and demand. Chapter 5. New York, 1922.

[29] Since $V(x, y) = R(x, y) - Q(x, y)$ and since the condition for maximum net revenue—subject to the usual test—is

$$\frac{\partial V}{\partial x} = \frac{\partial V}{\partial y} = 0,$$

x optimum and y optimum are obtained through simultaneous solution of the familiar equations

$$\frac{\partial}{\partial x} R(x, y) = \frac{\partial}{\partial x} Q(x, y) \quad \text{and} \quad \frac{\partial}{\partial y} R(x, y) = \frac{\partial}{\partial y} Q(x, y).$$

If perfect competition can be assumed to prevail as in agriculture, marginal revenues may be replaced by market prices Px and Py. The two equations may then be simplified to

$$Px = \frac{\partial}{\partial x} Q(x, y) \quad \text{and} \quad Py = \frac{\partial}{\partial y} Q(x, y).$$

[30] The term "marginal net value product" is avoided here because a strict interpretation of marginal physical productivity of a factor as the partial derivative of the production function with respect to this factor requires that the marginal net value product is identical with the marginal value product. The marginal value product is equal to the marginal physical productivity of a factor multiplied by the increment of the factor—usually taken as unity—and the marginal revenue of the product. If revenue is perfectly elastic to the individual producer, marginal revenue of the product can be replaced by the price of product.

any given product vector must always be equal to the price of any individual productive factor employed divided by the marginal physical productivity of the factor.[31]

The number of production velocities composing the product vector and the number of productive factors are theoretically irrelevant. If perfect competition cannot be assumed to exist, that is, if the demand for its product and supply of its productive factors are not perfectly elastic for the individual farm, the prices of products have to be replaced by marginal revenue and the factor prices by marginal unit costs. The marginal productivity approach may seem more complicated than the marginal cost approach because partial derivatives of the production function with respect to each productive factor have to be secured. However, this is also necessary, as shown above,[32] for the marginal-cost approach in finding minimum total costs for each point on the cost curve. The marginal-productivity approach has the advantage over the first approach in that

[31] This can be shown for joint production in the same way as shown by Schneider (op. cit., p. 42) for separate production and does not need to be repeated here. Marginal costs are now interpreted as partial derivatives of the combined total cost function, the equation must hold now simultaneously for all production velocities composing a product vector, and all production velocities except the one whose marginal costs are considered have to be kept constant. Using the same symbols as above (footnote 14), we may write marginal costs for any given product vector composed of two production velocities:

$$\frac{\partial}{\partial x} Q(x, y) = \frac{p_1}{\frac{\partial \phi(y, v_1, v_2 \cdots v_n)}{\partial v_1}} = \frac{p_2}{\frac{\partial \phi(y, v_1, v_2 \cdots v_n)}{\partial v_2}}$$

$$= \cdots \frac{p_n}{\frac{\partial \phi(y, v_1, v_2 \cdots v_n)}{\partial v_n}}$$

and simultaneously

$$\frac{\partial}{\partial y} Q(x, y) = \frac{p_1}{\frac{\partial \phi(x, v_1, v_2 \cdots v_n)}{\partial v_1}} = \frac{p_2}{\frac{\partial \phi(x, v_1, v_2 \cdots v_n)}{\partial v_2}}$$

$$= \cdots \frac{p_n}{\frac{\partial \phi(x, v_1, v_2 \cdots v_n)}{\partial v_n}}.$$

For the optimum product vector we can write therefore

$$Px \cdot \frac{\partial \phi}{\partial v_1} = p_1; \; Px \cdot \frac{\partial \phi}{\partial v_2} = p_2; \; \cdots \; Px \cdot \frac{\partial \phi}{\partial v_n} = p_n$$

and simultaneously

$$Py \cdot \frac{\partial \phi}{\partial v_1} = p_1; \; Py \cdot \frac{\partial \phi}{\partial v_2} = p_2; \; \cdots \; Py \cdot \frac{\partial \phi}{\partial v_n} = p_n.$$

[32] Footnotes 13–15.

it is better suited for practically useful approximations, although the latter may be theoretically not quite satisfactory. More will be said about this in the concluding section.

One may infer from the preceding paragraphs that the concept of intensity[33] of individual branches which is so frequently used in agricultural economics is better avoided under conditions of joint production. In particular, the optimum product vector cannot be obtained by determining the optimum intensity of individual branches. Intensity of individual branches presupposes an allocation of inputs, and, if used for determining the optimum product vector, begs the question.[34] Intensity is a concept which is better reserved to the farm as a whole. Besides, physical units or costs of one productive factor expressed per unit of another factor (for instance, per acre, or per man) can be used to determine the optimum product vector only if the factor used as basis is fixed. Existence of fixity, in contrast to limitationality,[35] does not affect the marginal productivity approach—except that its application to the fixed factors is, of course, impossible and unnecessary. The marginal productivity approach can therefore be used under short-run as well as under long-run conditions.

In a theoretically satisfactory way, the marginal-cost and the marginal-productivity approaches to the optimum product vector can be used only by those agencies, such as the state agricultural experiment stations and the United States Department of Agriculture, which have at their disposal cost and productivity data from a large number of farms with different product vectors, and which have also the trained personnel to analyze these data statistically. The procedures usually involve the more complex forms of mathematical statistics. If cost and productivity data from different farms and periods are to be used for arriving at a cost or a production function, it is essential that all disturbing factors are kept constant or that their influences are random and accidental among

---

[33] Intensity is the amount of labor and capital spent per unit of land area (acre) in the accounting period (year). It is practically impossible to compute a common weighted index of effective physical input units of labor and capital equipment per acre—as would be theoretically desirable. The most practical common denominator is money value, that is, costs of labor and capital. Costs, of course, are correct indicators of intensity only if prices are assumed to be constant.

[34] Among others, this is done in an otherwise valuable study in which a certain allocation of joint costs is assumed in order to determine the optimum product vector. Cf. Heinrich Marquardt, Die Ausrichtung der Landwirtschaftlichen Produktion an den Preisen, p. 35 ff. Jena, 1934.

The problem of allocating joint costs is discussed below.

[35] Cf. footnote 13.

the statistical population as far as the immediate problem is concerned. Such factors are differences in prices of cost factors, in physical location, in personal factors, and in the state of the arts.[36] This is not the place to discuss in detail the technical procedures and their underlying assumptions.[37] Only three theoretically important aspects of these procedures may shortly be considered: first, that the relationships which must be taken into account in obtaining partial derivatives from cost and production functions are usually curvilinear; second, that these relationships are not additive but joint; and third, that the independent variables dealt with may be interrelated.

In dealing with curvilinearity, graphical methods for obtaining net regression curves—the latter must be transferred into tabular series and the first differences taken in order to obtain marginal costs—are better suited than the least square method because the number of normal equations needed in the latter is increased by each new power of a production velocity. Graphical methods are in common use among agricultural economists, and their advantages and disadvantages have been frequently discussed.[38]

That the effect of different production velocities upon costs is not additive but joint has been stressed above. This, indeed, is the essence of the economics of joint costs. The least square method, on the other hand, assumes additiveness of relationships. For analytical functions nonadditiveness does not offer any difficulties in obtaining partial derivatives. In curve fitting, however, and in other practical applications of correlation analysis, modifications of

[36] The latter is mentioned because the data may relate to different periods in time.

[37] Differences in prices between localities and periods are easily corrected. It is often possible to keep natural location and technology of production constant by studying different localities separately. Differences in management can sometimes be disregarded if a large number of farms are included. If these simple devices are not sufficient, it becomes necessary to introduce these factors through appropriate variables into the combined total cost function and to allow for them mathematically. Cf. S. v. Ciriacy-Wantrup, Die zweckmässigen Betriebsgrössen in der Landwirtschaft der Vereinigten Staaten, pp. 129–142. Berlin, 1932.

[38] H. R. Tolley and M. J. B. Ezekiel, A method of handling multiple correlation problems. Jour. American Stat. Assoc., 18(144): 993–1003. December, 1923.

M. J. B. Ezekiel, A method of handling curvilinear correlation for any number of variables. Jour. American Stat. Assoc., 19(148): 431–453. December, 1924.

L. H. Bean, A simplified method of graphic curvilinear correlation. Jour. American Stat. Assoc., 24(168): 386–397. December, 1929.

J. D. Black and W. Malenbaum, The short-cut graphic method: an illustration of "flexible" multiple correlation techniques. Quart. Jour. Econ., 52 (1): 66–112, November, 1937. The use of the short-cut graphic method of multiple correlation: Comment—L. H. Bean. Further comment—Mordecai Ezekiel. Rejoinder—J. D. Black and Wilfred Malenbaum. Concluding remarks—Wilfred Malenbaum. Quart. Jour. Econ., 54(2): 318–364. February, 1940.

the usual procedures become necessary—a fact that is often not sufficiently recognized. Methods dealing with joint correlation problems have been in use for some time.[39]

Entirely different from the problem of joint relation of two or more not related independent variables to a dependent variable is the problem of interrelation between the independent variables. As previously mentioned (footnote 13), individual productive factors in the production function are often interrelated. Mathematically speaking, the production function is then subject to one or more side relations. If these side relations and the production function are known, no difficulties arise. In statistical curve fitting and particularly in the interpretation of coefficients of multiple correlation and net regressions such problems of "confluency," to use Ragnar Frisch's term, may create disturbances which must be accounted for.[40] A similar problem arises with respect to the interrelation of individual production velocities in the cost function. For purposes of this study the correlation between production velocities was either regarded as unity, in which case the theory of joint production is meaningless and unnecessary, or production velocities were regarded as capable of independent variations. It is self-evident that the latter assumption is tenable only within certain technical limits. These limits are usually rather wide and fairly well known. However, it may be well to keep in mind that the cost function may be subject to side relation in the form of boundary conditions, and that the tools of confluence analysis may be necessary to arrive statistically at marginal costs of individual production velocities.

The third, or indifference, approach to the determination of optimum product vector is theoretically as independent from the

[39] Cf. Ezekiel, Mordecai, The determination of curvilinear regression "surfaces" in the presence of other variables. Jour. American Stat. Assoc., 21(155): 310–320. September, 1926.

Frederick V. Waugh, The use of isotropic lines in determining regression surfaces. Jour. American Stat. Assoc., 24(166): 144–151. June, 1929.

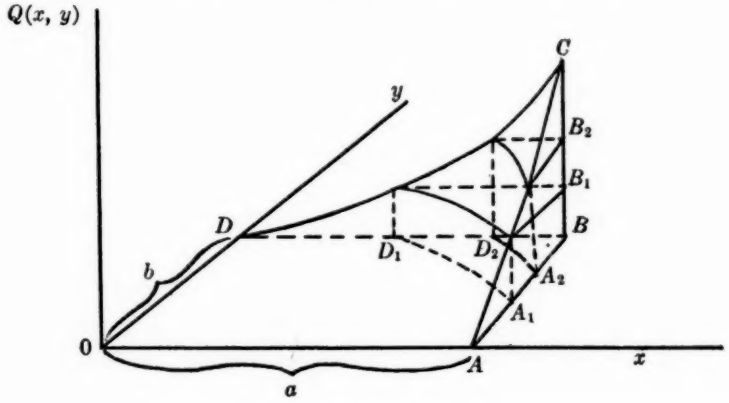
Andrew T. Court, Measuring joint causation. Jour. American Stat. Assoc., 25(171): 245–254. September, 1930.

[40] If the problem is merely to estimate the quantity of a dependent variable, for instance, of products or costs, from given quantities of independent variables, for instance, of factors or of production velocities, interrelation between independent variables is not harmful. However, if the "optimum" combination of variables is sought, as in our problem, interrelation between independent variables can no longer be neglected. Cf. H. Mendershausen, On the significance of another production function. Amer. Econ. Review 31(3): 563–569. September, 1941. T. Koopmans, Linear regression analysis of economic time series. Haarlem, 1937. Ragnar Frisch, Statistical confluence analysis by means of complete regression systems. Oslo, 1934. Ragnar Frisch and Bruce D. Mudgett, Statistical correlation and the theory of cluster types. Jour. American Stat. Assoc. December, 1931. 26(176): 375–392.

number of production velocities composing a product vector as the first two approaches. It offers no advantages, however, if more than two production velocities are considered. The relations between two production velocities and cost and revenues can be presented through three-dimensional graphs, and from these can be obtained "contour maps" of cost- and revenue-indifference curves. The relation between more than two production velocities and costs and revenues cannot be presented graphically, and the resulting cost- and revenue-indifference hypersurfaces are of little use for the ends in view. Confinement to two production velocities is not a serious handicap because practical questions of joint production are often concerned with only two production velocities. Moreover, two production velocities may be studied at a time if more than two have to be considered. In the latter case, however, the synthesis cannot be accomplished graphically but only with the help of mathematical tools.

A contour map from a three-dimensional graph, having as two horizontal coordinates the two production velocities and as the vertical coordinate costs, shows cost-indifference curves (or iso-cost curves) which connect points of equal total costs.[41] A similar contour map can be obtained for total combined revenue. In practice,

[41] The following diagram shows a part of the surface of the cost function $Q(x, y)$ and two cost indifference curves A_1D_1 and A_2D_2, for the costs BB_1 and BB_2. To make the figure more easily understood, only an arbitrary vertical section, determined by $y=b$ and $x=a$, of the cost surface is shown. The slope of DC is the partial derivative of $Q(x, y)$ with respect to x if y is held constant at b. The slope of AC is the partial derivative of $Q(x, y)$ with respect to y if x is held constant at a. It can generally be expected that DC and AC are convex toward the plane $OABD$. This means that the cost surface $OACD$ is such that cost indifference curves, which represent the contours of this surface, are concave toward the origin.



cost- and revenue-indifference curves can be constructed directly by computing costs, and revenues for some points in the field between the two horizontal coordinates and by connecting points of equal costs and equal revenues. The shape of the cost- and revenue-indifference curves may vary greatly. Cost-indifference curves, however, must not intersect each other—the same applies, of course, to revenue-indifference curves—and there must be only one point on each curve which corresponds to a given direction; otherwise indifference curves could not be used as polar coordinates. These conditions, which also apply to revenues, are fulfilled if combined total costs on one hand, and combined total revenues on the other, are monotonic increasing functions of the product vector. This is always axiomatic for combined total costs and, if perfect competition prevails, for combined total revenues. Under monopoly, of course, combined total revenues are not necessarily monotonic increasing functions of the product vector.

If a series of iso-cost curves and a corresponding series of iso-revenue curves are superimposed upon each other, each revenue-indifference curve will usually be intersected by numerous iso-cost curves. For each iso-revenue curve there is one innermost iso-cost curve which has one common point with this iso-revenue curve, but otherwise lies completely between the iso-revenue curve and the origin.[42] This point of tangency indicates a product vector which yields the given revenue with minimum costs, or, expressed differently, yields the highest revenue for a given cost. If a number of these points are connected, a curve is obtained which may be called the "curve of optimum direction" because the optimum product vector must be located on this curve. This curve remains one-dimensional, even if more than two production velocities are considered. It is a space curve.

The optimum product vector is determined by optimum direction and optimum length. Direction is measured here not along a circle, as in the usual system of polar coordinates, but along an iso-cost curve. Length is measured as usual along a bundle of rays passing through the origin, for instance, along any one of the two coordinate axes. The construction of the curve of optimum direction eliminates the problem of unknown optimum direction. Direction is now defined as function of length. This reduces the prob-

[42] If no common point fulfilling this condition exists, no joint production is economically feasible, as will be illustrated through an example below. Usually not more than one point of tangency will exist. If more than two points of tangency exist, both may serve for the purpose discussed below.

lem of finding the optimum product vector composed of more than one production velocity to the special case of finding one optimum production velocity. By determining the latter for any one of the production velocities composing the product vector, optimum length is determined. For this the tools of marginal analysis are used. Marginal costs and marginal revenues are now ordinary derivatives and have reference to the whole combination which for any given production velocity is given by the curve of optimum direction.

There are several factors that make the indifference approach particularly applicable to agriculture. If changes in direction of the product vector of individual farms do not affect the prices of products (which is implied in the assumption of perfect competition), iso-revenue curves are represented by parallel lines which intersect the axes in points, the distance of which from the origin is inversely proportional to the prices of the two products. The iso-revenue field is therefore easily constructed. Iso-cost curves are normally concave to the origin as shown above.[43] Points of tangency between parallel straight iso-revenue curves and the corresponding innermost iso-cost curves are thus established without difficulty. If iso-cost curves are convex to the origin, no joint production is possible and no problem of direction arises. This is shown by the fact that the common point of a given iso-revenue curve with the innermost iso-cost curve is now located on one of the axes.[44] For practical purposes empirical values at points on the iso-cost curves do not need to be very close together on the same curve, nor is it necessary to space the curves very closely. Interpolation yields the intermediate values. It is sufficient to obtain iso-cost curves for a limited range of possible proportions, that is, only for a section of the indifference field—as in the diagram, (footnote 41).

Fixed costs do not influence the shape of the iso-cost curves and cannot influence direction. Fixed costs disappear when marginal costs are computed in the determination of length. The optimum product vector is, therefore, not affected by fixed costs. This is the same result as that obtained through the use of partial derivatives above.

---

[43] Footnote 41.

[44] Under imperfect competition, convexity of iso-cost curves does not necessarily make joint production impossible. If, for instance, iso-revenue curves are more strongly convex than iso-cost curves, a point of tangency may exist which fulfills the requirements for points on the curve of optimum direction and is not located on one of the axes.

Iso-cost and iso-revenue curves may be expressed on a per-acre basis. Iso-cost curves may then be called iso-intensity curves. These curves, however, refer to the farm as a whole and give no indication of the intensities within individual branches. They can be used for the determination of optimum direction only if total combined land costs are fixed costs. This also was indicated by the marginal-cost and marginal-productivity approaches.

If cost and revenue data from different farms and accounting periods are used in the construction of iso-cost and iso-revenue curves, care must be taken, of course, that the disturbing factors already mentioned are kept constant.

All three approaches to the optimum product vector can be used not only by private enterprises in agriculture and nonagricultural industries but also by public and semipublic concerns provided the difficulties in defining and measuring costs and revenues in comparable units can be solved. These difficulties are no less present in the allocation of joint costs to be discussed in the next section. This is often overlooked by those who regard allocation of costs as a possible or even necessary approach to determining the optimum product vector of public or semipublic concerns.[45]

4. *Allocation of Joint Costs and the Problem of Internal Pricing*

Allocation of costs has various meanings and may be undertaken for numerous purposes. Allocation of costs over time (that is, over different accounting periods) and over different ranges of production velocities are problems of sunk and of fixed costs. Since they are not peculiar to joint production, they will not be discussed here. In joint production the allocation of costs is the allocation of combined total costs of product vectors to individual production velocities composing these product vectors through systematic procedures of accounting.

As far as components of a product vector are independent in costs, such independent costs can be allocated for all purposes of accounting. Independent costs of joint production are treated in the same way as costs of separate production.[46] It is irrelevant

[45] In recent years the controversy about the allocation of joint costs in public or semipublic concerns has centered around the large multiple-use hydroelectric projects undertaken under the auspices of the federal government since World War I. For literature and discussion on this point, see: Horace M. Gray, Joint costs in multiple-purpose projects. American Econ. Rev., 25(2): 224–235. June, 1935.

[46] If $Q_i(x, y)$ stands for total independent costs of two production velocities x and y, one may write for them: $Q_i(x, y) = Q_i(o, y) + Q_i(x, o)$.

whether they are variable or fixed, or whether they are to be allocated as total, average, or marginal costs.

Allocation of complementary and competitive costs is not so simple. At the margin they can be allocated together with independent costs because of the definition of marginal costs. Marginal costs of joint production are allocated through the process of their computation itself. The statistical procedure of obtaining marginal costs was discussed in the second section and nothing needs to be added here.[47]

Complementary and competitive costs can be allocated as totals and averages only in so far as they appear together with independent costs in the integral of marginal costs of individual production velocities.[48] The sum of the total costs of individual production velocities arrived at in this way does not necessarily coincide with the combined total costs of the product vector because fixed costs are not, of course, taken into account. The average costs of individual production velocities thus computed are, for the same reason, average variable costs. The technical difficulties are the same as those of obtaining partial derivatives. They can be mastered only by research organizations and not by individual farmers. The results of such statistical investigation are not directly usable on any one of the individual farms. This, however, may not be relevant if average costs of large groups of farms are to be allocated as an aid for governmental agricultural policies and similar collective purposes.

Unfortunately, such a theoretically sound allocation of joint costs has very little usefulness. It is necessary here to point out the inherent limitations of joint cost allocation because its potentialities in private and social accounting are frequently overrated. Three main purposes of accounting may be differentiated. The most

---

[47] Allocation of marginal costs between freight and passenger traffic of railroads has been attempted by Crum, using data for some 200 railroads, published by the Interstate Commerce Commission. (W. L. Crum, The statistical allocation of joint costs. Jour. American Stat. Assoc., 21(153): 9–24. March, 1926.) This study oversimplifies the problem by assuming linear relationships throughout and by disregarding variables other than the two production velocities. There is no clear differentiation between complementarity, competitiveness, and independence in total and marginal costs. Besides, it has been questioned by J. M. Clark (op. cit., p. 59 and chapters 13–15) and others whether freight and passenger traffic of railroads are good examples of jointness. In many instances they are competing, not joint, products. Crum's general approach, however, deserves mentioning as a pioneering effort in applying the theoretical tools of cost theory to practical problems of cost allocation.

[48] The integral contains, of course, an arbitrary constant, but this is irrelevant for our problem.

important is the assistance it can render in production planning, that is, in determining the optimum product vector. The second is to furnish periodically profit and loss statements and balance sheets for the whole farm—the so-called "financial accounting." The third is the computation of average costs of production which in turn may be desired for numerous reasons. The preceding section has shown that allocation of joint costs can contribute nothing to the first purpose, whether the method of allocation is theoretically sound or not. The marginal productivity and the indifference approaches to the optimum product vector are entirely independent from the allocation of joint costs. The marginal cost approach requires only the allocation of marginal costs which, as just stated, can hardly be regarded as a problem. Allocation of joint costs has no significance for financial accounting because its problems are those of fixed and sunk costs and not of joint costs. The third purpose of accounting, namely, to provide average costs of production, is the one for which the question of joint cost allocation is important. In fact, because this purpose is still highly regarded by many public bodies, economists, accountants, and entrepreneurs, does allocation of joint costs appear necessary and significant. In agriculture, average cost of production accounting holds a strong position in many government offices, colleges, and experiment stations. The theoretically sound way of allocating joint costs does not meet the requirement of average cost of production accounting because—as stated above—only average variable costs are computed, and the results of highly complex statistical research with numerous farms cannot be directly transferred to the accounting on any one of the individual farms. The question arises, therefore, "What is the theoretically least unsound of technically simple bases for the allocation of joint costs?"

Of the many necessarily more or less arbitrary bases for allocation of joint costs, the following appear the most important: First, some variable costs—for example, labor costs—which are independent or are regarded as independent; second, physical output; and third, gross revenues. The first two have little relation to the theoretically sound allocation of joint costs, and have practically no advantages over the third. The third is based on the implicit assumption that not only marginal but also average costs of individual production velocities are equal to the respective prices, and that therefore, average costs of individual production velocities stand in the same relation to each other as do the product prices

and total costs of individual production velocities to total revenues. It is true that under the assumptions made above with respect to competition, knowledge, and the goal of economic activity, marginal costs are equal to product prices if the optimum product vector is realized. It is also true that for the optimum product vector in long-run equilibrium, marginal costs tend to be equal to average costs, including rents—if average costs of joint products could be ascertained. This, however, does not mean that it is theoretically correct to allocate joint costs existing in a particular farm at a particular instant on the basis of revenues. Nevertheless, if product prices are properly chosen to represent, as far as possible, long-run equilibrium conditions, this basis is less objectionable than most others and is just as simple. Though its use in determining the optimum product vector does beg the question, this objection is not relevant because allocation of costs is unnecessary for the determination of the optimum product vector. For other purposes, this basis for allocation may be used. First, this applies to average cost of production accounting because it is necessary to "dispose" of joint relationships as a matter of formal completeness in bookkeeping. Second, cost allocation on this basis is suited for purposes of appraisal, taxation, and governmental agricultural policies if necessarily highly inaccurate data on total combined costs of many farms are to be allocated to individual products.

Closely related to the problem of joint-cost allocation is that of internal pricing. Frequently, within a concern as a whole, prices are assigned to materials produced by one branch and consumed by another. This is necessary for average costs of production accounting if each asset is evaluated individually. It may happen also that the two branches are geographically separated or have their own accounting system for some other reason—for instance, if the managers of individual branches are paid on the basis of net revenues of each branch.

If the materials produced by branch A and consumed by branch B are marketable under free competition, such a relation alone is not a sufficient economic condition to bring about joint producton. Without complementarity of total costs, the two branches can just as well operate as individual firms. Each branch can determine its own optimum production velocity separately. The optimum product vector is simply composed of the two optimum production velocities. In order to obtain this state of affairs the internal price must be equal to the prevailing market price. If B would pay less

than the market price, A would sell its whole production on the market to realize its optimum production velocity. If compelled by the management of the whole concern to sell the quantity demanded by B at a lower price, the whole concern would be worse off. A would not change its production velocity. B would increase its production velocity if the factor obtained from A were a variable factor—as is usually the case. The gain to B, however, would be less than the loss to A. It can be assumed that all factors are employed at decreasing marginal productivities, and that their marginal-value product is equal to their prices. A decrease in the price of the factor obtained from A would induce B to increase the input of this factor until its marginal-value product is again equal to its price. The gain for B on all previously employed units of the factor would be exactly offset by the losses of A. The gain for B per additional unit—that is, the marginal-value product minus the price of the factor—would decline to zero from a figure equal to the price decrease. At this point the new equilibrium is reached. On the other hand, the loss for A per additional unit would remain constant and equal to the price decrease. Likewise, the whole concern would be worse off if the management of B were compelled to pay more than the prevailing market price for the product obtained from A. Again, A would not change its production velocity. A would do better to purchase the quantity demanded by B at the prevailing market price and to sell to B at a profit than to increase its production velocity above the optimum level. The gain of A would exactly offset the loss of B. There would be another loss, however, because B would be forced to reduce its production velocity below the optimum level.

With complementarity of total costs, the optimum product vector cannot be obtained by letting each branch determine its own optimum production velocity independently. The optimum product vector is determined in the familiar fashion without the help of an internal price. For purposes other than determining the optimum product vector—for instance, for obtaining average costs of production—the market price is still used as internal price because of the general principle of accounting that direct valuations (in Canning's sense)[49] are generally preferable to indirect ones.

[49] Cf. J. B. Canning, The economics of accountancy, p. 207. New York, 1929. "A direct valuation is possible when and only when a realized money income exists and is statistically determinable. The increments of such an income may be either positive or negative in sign and may be distributed in future time in any way." Canning employs the term "realized income" in Irving Fisher's sense.

Next, the problem of internal pricing may be studied if the materials produced by A and consumed by B are not marketable.[50] First, the case without complementarity of total cost may be considered. A and B are related only through the fact that B is the sole market for A. The whole concern appears now as the producer of only one marketable product. The most direct way of determining the optimum product vector would be to regard all costs as costs of this product, and to determine the optimum production velocity for this product in the same way as in separate production. If A and B are nevertheless regarded as separate branches, the internal price must be set in such a way that no other than this production velocity is realized by B. This condition requires that the marginal-cost function of the whole concern and that of B must be identical because the marginal-revenue functions are identical. If the marginal-cost functions are identical, the total-cost functions must also be identical, with the possible exception of an arbitrary constant. The total-cost function of the whole concern and that of B are composed of the same items, with the difference that that of the whole concern contains the total-cost function of A, in the place of which the total-cost function of B contains the production velocity of A multiplied by the internal price. If the arbitrary constant is zero, it is apparent that the internal price must be equal to the total-cost function divided by the production velocity of A. In other words, the internal price is equal to the average costs of A. If the arbitrary constant is larger or smaller than zero, the internal price is equal to the average costs of A, plus or minus the constant divided by the production velocity of A.

If, however, A is joint with another branch C, the product of which is marketable, the production velocity of A is related to the production velocity of B *and* C. The above analysis becomes inapplicable. The product vector is now composed of the production velocities of B and C, which are joint through the product of A, and which are both oriented on the market, that is, B and C can both adjust their production velocities through equating marginal costs and marginal revenues. The optimum product vector is determined in familiar fashion without regarding A as a separate branch. For other purposes of accounting, A may be regarded as a separate branch and the internal price determined by indirect valuation—commonly a form of opportunity valuation—of the product of A.

If the costs of A and B are complementary, the above analysis

[50] Cf. also H. von Stackelberg, op. cit., p. 70.

becomes likewise inapplicable because no average costs for the product of A can be computed. It is only possible to say that the internal price cannot be lower than the marginal costs of A. In this case the optimum product vector of the whole concern is calculated by determining the optimum production velocity of B, without regarding A as a separate branch. For other purposes of accounting, the internal price is determined by indirect valuation.

5. *Classification of Jointness in Agricultural Economics*

The importance of joint production in agriculture has induced most writers on agricultural economics, and particularly on farm management, to give attention to different types or classes of jointness. Some writers merely describe how jointness is related to the technical characteristics of important productive factors such as land, labor, equipment, and raw materials. Von Thünen, for instance, stresses the importance of diversification in relation to conservation and amelioration of the land.[51] American writers like Warren, Adams, and Spillman stress the importance of diversification in relation to the use of durable equipment, and especially of labor.[52] Another classification of these aspects is used by Brinkmann, who differentiates between jointness of farm branches through land, through productive factors other than land, and through nonmarketable materials produced by one branch and refined and marketed through another.[53]

Differentiation of types of jointness on this basis has practical advantages because each productive factor has peculiarities of its own with respect to appearance, utilization, and the study of complementarity. This is particularly true for the land. From an economic and social standpoint it is sometimes interesting to

---

[51] J. H. von Thünen, Der isolierte Staat. Vol. 1, Chap. 1. Hamburg, 1826. This is related to the role played by the concept of "statics" in Thünen's system discussed elsewhere. (JOUR. FARM ECON., 20(1): 96 ff. February, 1938.)

[52] G. F. Warren, Farm management. New York, 1913.
R. L. Adams, Farm management. New York, 1921.
W. J. Spillman, Farm management. New York, 1923.

[53] Theodor Brinkmann, Die Oekonomik des landwirtschaftlichen Betriebes. Tübingen, 1922. (This study was completed in 1914.) Translation: Theodor Brinkmann's Economics of the farm business. By Elizabeth Tucker Benedict, H. H. Stippler, and M. R. Benedict. Berkeley, 1935. Brinkmann terms his three classes of jointness in agriculture: land use jointness, "Bodennutzungsgemeinschaft"; equipment jointness, "Bodennutzungsmittelgemeinschaft"; and refinement jointness, "Verwertungsgemeinschaft." Often the refining branch requires the addition of other raw material branches because the refining branch is usually a livestock branch and because livestock requires a diversified ration throughout the seasons.

differentiate between jointness determined mainly by complementarity of the factor land and that determined mainly by complementarity of labor or equipment. The farming systems resulting from the two are entirely different. The former complementarity can be utilized only through diversification of land use, whereas the latter may be utilized through addition of branches using no or little land or may lead to peculiar forms of labor organization—for example, regular migrations of labor—or to certain forms of cooperation in the use of equipment. In other words, joint costs connected with land tend to increase diversification of land use per farm, whereas joint costs connected with labor and equipment may only lead to diversification per region, but may leave individual farms specialized. California agriculture affords interesting examples of the effect of these different types of jointness.

Other scholars differentiate types of jointness on the basis of what they regard as fundamental relationships between branches. H. C. Taylor, who in the 1919 edition of his widely known text, speaks only of supplementary relationships in contrast to competing relationships,[54] differentiates in the 1925 edition between supplementary and complementary relationships.[55]

> Enterprises may be said to be supplementary when their demands for the labor, horses, and machinery of the farmer do not seriously conflict. Enterprises which supplement each other in various ways help to reduce the idle time of men, horses, and equipment, and the idle land as well. . . .[56]
>
> Complementary relations between enterprises are evident when one enterprise makes a definite contribution to another. Crops and livestock are frequently mutually complementary, as crops furnish feed for livestock, and livestock in turn furnish fertility for the crops.[57]

Evidently, supplementary relationships comprise the first two types of jointness differentiated by Brinkmann, and complementary relationships have similarity with Brinkmann's third type of jointness. In the discussion of joint costs in a later part of the book, the previous differentiation between supplementary and complementary relationships is not mentioned.[58]

It is interesting to note that L. C. Gray, in his text on agricul-

---

[54] H. C. Taylor, Agricultural economics. Chap. 5. New York, 1919. In the 1905 edition (reprinted 1912) the term "supplementary" does not appear. (H. C. Taylor. An introduction to the study of agricultural economics. New York, 1905.)

[55] H. C. Taylor, Outlines of agricultural economics. Chap. IV. New York, 1925.

[56] Ibid., p. 37.

[57] Ibid., p. 38.

[58] Theodor Brinkmann, Op. cit., pp. 490–492.

tural economics published one year earlier, had used the terms "supplementary" and "complementary" in just the opposite sense from Taylor's.[59] Gray's definitions are as follows:

> Enterprises are supplementary when the production of one is an aid to or contributes to the production of the other. . . .[60]
>
> Enterprises which do not compete seriously are known as complementary.[61]

Then follows an enumeration of the ways in which branches may be supplementary:

> (1) Livestock may be the cheapest way of marketing bulky products—especially of marketing products which could not otherwise be sold, such as roughage and spoiled grain.
>
> (2) If livestock or livestock products constitute the main enterprise, a crop may be raised because it tends to balance the feeding ration even though it might not be profitable alone if produced for the market.
>
> (3) Livestock contribute manure to crop production, the purchase of which would be unprofitable if it had to be transported from a distance to the farm.
>
> (4) One kind of livestock may be kept to consume what other kinds of stock waste or fail to use.
>
> (5) Tilled crops supplement grain crops by clearing out the weeds which accumulate when small grain is raised year after year on the same land.
>
> (6) Grain crops serve as nurse crops for grass crops.[62]

This enumeration shows clearly that Gray's supplementary relationships are identical with Taylor's complementarity and the refinement jointness of Brinkmann.

Into this somewhat confused status of terminology J. D. Black injected a classification of jointness which has come into general use among agricultural economists in the United States.[63] Black differentiates between a joint-product relationship, a supplementary relationship, and a complementary relationship.

> In the joint-product relationship, the objective is the fuller use of the raw materials, the materials worked upon; in the supplementary relationship the objective is the fuller use of the other elements of production; of labor, the active agent; of the building and equipment, the thing worked with; and the supplies, the materials used up. In the complementary relationship the product of one enterprise becomes the supplies of the other.[64]

---

[59] L. C. Gray, Introduction to agricultural economics. New York, 1924.
[60] Ibid., p. 132.
[61] Ibid., p. 132.
[62] Ibid., pp. 132, 133.
[63] John D. Black, Introduction to production economics. New York, 1926. (A mimeographed version was distributed one year earlier.)
[64] Ibid., p. 207.

Although Black pays little attention to supplementary relationships based on the land—he is rather inclined to stress the competing relationships connected with this factor—it is clear that he uses the terms "supplementary" and "complementary" in the same sense as Taylor. The term "joint" is narrowed down to indicate the relationship between products which emerge by splitting "materials worked upon." These terms apply to relationships in general—as intended by Black—but are commonly applied to branches involved in such relationships often without noting that usually all three relationships are present simultaneously.[65]

Reservation of the term "joint" to one single form of jointness appears unfortunate. This particular type of jointness happens to be connected with complementarity—in the sense defined above—of raw material costs, which are usually variable costs. The impression is created that fixed costs cannot be joint costs. Such a misunderstanding is facilitated by Black's differentiation between "joint relationships" and "supplementary relationships." Marshall and many other writers on economic theory, management, and accounting refer to fixed costs as "supplementary costs." As an example that fixity and jointness in costs can easily be confused, one needs only to mention the famous controversy of Edgeworth, Taussig, and Pigou about fixity and jointness in railroad economics.[66] Furthermore, reservation of the term "joint" to this type of jointness facilitates the mistake of regarding products as bona fide joint only if the direction of the product vector shows a technical resistance to change. It happens that many, but by no means

---

[65] There is no hard and fast line of demarcation between "materials worked upon," "materials used up," and the "product of one enterprise which becomes the supplies of the other." Usually all three aspects are present simultaneously, and besides materials other factors are used jointly. If some butter is sold during certain seasons from a beef-cattle range, the relationship between the beef and dairy branches may be looked upon—in Black's terminology—as a joint-product, a supplementary, or a complementary relationship. If straw is baled and sold in the slack season, the straw and grain branches are interlocked through joint-product, supplementary, and complementary relationships.

[66] F. Y. Edgeworth, Contributions to the theory of railway rates. Econ. Jour., 21(83): 346–370, September 1911; 21(84): 551–571, December 1911. 22(86): 198–218, June 1912. 23(90): 206–226, June 1913.

F. Y. Edgeworth, Papers relating to political economy. Econ. Jour., 1, sec. I (D) pp. 100–107; sec. II G, pp. 172–191. London, 1925.

F. W. Taussig, Railway rates and joint cost once more. Quart. Jour. Econ., 27: 378–384. February, 1913.

A. C. Pigou and F. W. Taussig, Railway rates and joint cost. Quart. Jour. Econ., 27: 535–538, May 1913; 27: 687–694, August 1913.

Cf. also J. M. Clark, op. cit., pp. 98–103.

all, joint products that emerge by splitting a common raw material show greater technical resistance to changes of proportion than most joint products that stand in supplementary and complementary relationships—in Black's terminology. Examples are cotton and cottonseed, grain and straw, hide and beef, mutton and wool, and many others. The problem of jointness is, therefore, frequently regarded merely as a technical problem of production and not as an economic one.

It would be quite in order that the term "supplementary relationship" give the connotation of Marshall's "supplementary costs," if supplementary relationships were always connected with supplementary costs. This, however, is by no means implied in Black's use of the term. Many supplementary relationships are admittedly based upon "the fuller utilization of materials and supplies" which are usually variable costs, or, in Marshall's terminology, prime costs. Many supplementary relationships are indeed related to fixed costs in a way discussed below. The relation to fixed costs, however, is not the relation which is suggested by the term and not *de facto* implied in the meaning of "supplementary relationship."

Black's concept of "complementary relationship" must clearly be differentiated from the above concepts of a complementary relation between productive factors and costs in the study of production and cost functions of individual firms and of a complementary relation between products in the study of demand and supply functions. That "the product of one enterprise becomes the supplies of the other" does not in itself offer any incentive for joint production.[67] Such a relation exists between many different firms and industries, as well as between different branches. There is no objection against speaking of complementarity between branches in the same sense as of complementarity between separate firms and industries. But such a complementarity in itself is not a problem of joint production, as a cause of which it appears in Black's discussion. Only if the raw material gives rise to complementarity in costs or revenues, or both, in the sense defined above, does it present an incentive for joint production.

These comments do not, of course, imply that Black's classification of jointness is logically impossible or without value. Each

[67] Marketing costs may or may not be complementary. In any case, they constitute only a portion of total costs which may be competitive in the aggregate.

type of joint relationship differentiated by Black has peculiarities of its own which may, therefore, be used as a basis of classification. The classification has stimulated interest in the economic principles underlying farm organization and is used in the teaching of production economics and farm management in most agricultural colleges of the United States.

A classification somewhat different from those discussed so far may be presented because the author has found it useful in certain problems of farm management research. Three types of jointness may be differentiated which may be called tentatively "process jointness," "time jointness," and "risk jointness."

Process jointness prevails if two or more products are joint in such a way that one productive process unavoidably and at the same time yields two or more products completely or, what is more common, in part, that is, as nonmarketable raw materials. The proportion between these products may vary greatly, but separate production is technically not possible. Complementarity in costs of process joint branches cannot be traced to individual productive factors, but only to a whole technically indivisible process. Process jointness can always be detected as a physical phenomenon in observing one process. This can easily be done if complete process jointness exists—like wool and mutton—or if one productive process yields a clearly visible raw material like manure, straw, chaff, stalks, and sugarbeet leaves. Many crops, on the other hand, are joint products through their favorable or unfavorable physical, chemical, or biological effect upon the soil. These effects are visible only to the specialist. If this effect can be utilized, or costs for restoring the previous status of the soil avoided by producing a variety of crops, these crops are process joint in the same sense as crop and livestock branches which are joint through the use of manure, straw, chaff, and other materials.

Time jointness prevails if individual productive factors used in the process of producing one product are used in a different process or processes of producing one or more different products. This happens where productive capacity of factors cannot be utilized at a constant rate over time by one process, and where another process can use these productive capacities during a time when they are not used by the first. This form of jointness must obviously be connected with productive factors not used up by one productive process in one instant of production. Factors of this kind represent

a stock of productive services.[68] The costs of these factors may be called sunk cost to differentiate them from fixed cost.[69] Time joint costs are therefore always sunk costs. Durability of a productive factor is, of course, *conditio sine qua non* of sunk costs.[70] Complementarity in costs of time joint branches can be traced to individual productive factors. On the other hand, time jointness cannot be observed as a physical phenomenon in considering only one process. Separate production is technically possible if time jointness prevails.

Time jointness occurs in most industries subject to violent fluctuations over time in the use of their productive facilities. The importance of time jointness, however, is especially great in agriculture. All activities in agriculture are influenced much more by regular daily and seasonal cycles and by irregular variations of the weather and other natural factors than are most industries. These variations definitely limit the time during which productive facilities can be used for the production of a given crop. Furthermore, agriculture deals with the production of living organisms which are extremely sensitive in the timing of application of capital and labor to the land. Mistakes in this respect lead to gravest economic consequences. To guard against this danger, most crops require productive facilities incommensurate with the short time they are actually in use. Many crops use the land less than half a year. Many expensive sets of machinery are used by one crop only one

---

[68] Cf. footnote 11.

[69] The relation between fixed and sunk costs will be discussed among other aspects of fixity in costs in a forthcoming article. It can be shown that productive factors giving rise to fixed and lumpy costs must be usable for more than one instant of production. However, fixed and lumpy costs are not differentiated on the basis of their fixity with respect to time, but on the basis of their fixity with respect to range of production velocity or, generally speaking, to the length of the product vector (compare footnote 16). If the time dimension of fixity is considered, both may be discussed as sunk costs. In addition, variable costs may also be sunk costs. Often a quantity of factors, the costs of which are variable in instantaneous production, are obtained and carried voluntarily or involuntarily as a stock. In agriculture, many productive factors cannot be fully used for that process and that instant of production for which they are obtained. Fertilizer and many other cost factors have uncontrollable gradually disappearing aftereffects for a considerable period of time. Such variable costs are not fixed over any range of production velocity, but only over time. In allocating sunk variable costs over time in cost accounting, they are, of course, treated in the same way as fixed and lumpy costs.

[70] A durable factor in the economic sense is simply defined as a factor which is not used up by one productive process in one instant of production. An instant of production refers to a single closed period of production. Measured in "clock" time, an instant varies, of course, greatly with the products and technology. Instant of production is not to be confused with accounting period.

or two weeks, and often only a few days during the year. Labor requirements vary to a similar degree. From the standpoint of utilizing complementary costs of this type, it is fortunate that some branches are by nature very different from others with respect to the time of the year during which they require factors of production. Besides, from very early times human ingenuity has succeeded in changing the natural requirements of useful plants and animals through breeding and selection. There are a few enterprises the requirements of which are rather flexible and which can be used therefore as fill-ins at any time.

Risk jointness prevails if the production of two or more products is joint in order to spread risks. Risk is an element of costs not only if contingencies with a statistically ascertainable probable mean and probable distribution around the mean are considered, but also if the probability of losses is based on less accurate knowledge of the statistical population. In other words, F. H. Knight's distinction[71] between risk and uncertainty, challenged by Myrdal, Swanson, and others,[72] is not adopted here—although many of the risks which are of interest in this connection can be calculated from past group experience.[73] Without overstretching the conceptual framework developed above, one may say that certain risks represent complementary costs because increases in costs and decreases in revenues related to them are lower in joint production —provided the joint branches have different risk properties—than in separate production. This interpretation of certain risks described below is not changed by the fact that it may be more economical to eliminate them through payment of insurance premiums or to bear them without trying to spread them. Attempts to shift

---

[71] "The practical difference between the two categories, risk and uncertainty, is that in the former the distribution of the outcome in a group of instances is known (either through calculation *a priori* or from statistics of past experience), while in the case of uncertainty this is not true, the reason being in general that it is impossible to form a group of instances, because the situation dealt with is in a high degree unique." Frank H. Knight, Risk, uncertainty and profit, p. 233. New York, 1921.

[72] Cf. E. W. Swanson, An hiatus in the risk theories of Knight and Myrdal. Proceedings of the Nineteenth Annual Conference of the Pacific Coast Economic Association, pp. 84–88. December, 1940. This article cites pertinent literature.

[73] Uncertainty may find quantitative allowance in the determination of the optimum product vector in the same way as risks. Allowance based on "hunches" and "intuition" is nevertheless based on some knowledge of the statistical population dealt with. The difference between "a priori" and "statistical" probabilities on one side and "estimate" probabilities on the other lies in the degree of precision with which the statistical population can be described.

bearing of these risks to economic groups outside the farm may affect the product vector in a socially undesirable way because the incentive to utilize possibilities of reducing their costs through combination of different branches is eliminated. An example of this is a government crop-insurance plan where farmers do not pay the full premium but shift part of the risks to the general taxpayers.

Not all risks can be reduced by diversification of production. In agriculture, however, a considerable part of the two most important risks, namely, of physical hazards of nature and of marketing,[74] can be considerably and economically reduced in this way. Many of the natural unavoidable production risks of agriculture affect different branches to a greatly different degree; they may even work in opposite directions. This is true for excesses or deficits of heat and moisture, for hail and other storms, for plant diseases, animal diseases, and insect pests. Other natural risks, such as fire, are not "specific" and cannot be reduced by combining branches. Certain marketing risks, for instance, those caused by seasonal variations of crop production and the cyclical variations of livestock production, are closely related to natural forces which affect different branches in different ways. Such risks can be reduced through diversification of the production program. Reasons for the specific nature of risks are differences in general sensitiveness of the various plants and animals to natural hazards, differences in periods of growth during which plants and animals are sensitive, and differences in growing seasons. With respect to marketing risks, one may add differences in elasticity of demand.

Process jointness, time jointness, and risk jointness may, of course, all be present in the relationship between branches. This is the rule for the relationship between crop branches, and frequently for the relationship between crop and livestock branches. Sometimes a relationship may be interpreted as process jointness from one standpoint and as time jointness from the other. Spring, summer, fall, and winter grazing at different elevations in the California foothill grazing belt is process joint if one regards livestock as a product that reaches the finished stage in passing from one branch to the other, and time joint if one regards livestock as a factor of production that is used by different branches at different periods of time. The former viewpoint is appropriate for livestock produced for sale; the latter for livestock kept for reproduction.

[74] Cf. C. O. Hardy, Risk and risk bearing. University of Chicago Press, 1923.

6. *Practical Approximations for Farm Management and Farm Accounting*

The usefulness of theory in any applied field of economics is not ended by explaining economic relationships in general and by pointing out the "correct" solution of economic problems *in abstracto*. The further task of theory is to help in the development of simplifications and approximations which make theoretical solutions practically more applicable, to guide in the gathering of data needed for practical application, and to apply theoretical tools to the problems of economic reality. In this article we have to confine ourselves to the two former tasks. An attempt will be made to simplify the theoretical approaches to the optimum product vector and to appraise the various forms of farm accounting with respect to their usefulness in joint production. Before the tools developed can be applied to problems of economic reality—for instance, to a better understanding of the formation of farming systems, to the adjustment of agricultural production by farms and regions, to the development of stable agricultural employment, to conservation policies, and many others—the various dimensions of fixity in costs and their relation to jointness in costs have to be more thoroughly explored than was possible here.

The derivatives needed in all three approaches to the optimum product vector and the necessary "corrections" of data discussed previously are too difficult for the operator of a family farm to use. He is usually unskilled in the more complex forms of statistical analysis. Furthermore, under dynamic conditions of economic reality, determination of new marginal schedules of productivity, costs, and revenues, every time a change in expectation pattern occurs, involves a great expense in time and effort.[75] Even for skilled personnel this is disproportionate to the possible improvements in net revenue because production functions change rapidly, and in agriculture prices of cost factors and of products cannot be anticipated for more than one production interval. It is usually not worth while, therefore, to determine accurately the product vector which will maximize net revenues. Maximization of net revenues as a goal of managerial decisions is replaced by the more modest goal of increasing existing net revenues. Not the optimum product

[75] Past experience is, of course, often misleading because conditions have changed. However, purely hypothetical cases may be used to determine marginal schedules of productivity, costs, and revenues.

vector but a step-by-step change of the existing product vector in the direction of the optimum product vector is the practically obtainable goal of farm management.

If the goal of farm management is stated in this way, determination of marginal costs of individual production velocities becomes unnecessary. Partial derivatives can be approximated through average costs of a given increment in one production velocity if other production velocities are kept constant. If $Q(x_1, y_1)$ denotes the cost of the existing product vector and $x_2 - x_1$ the increment in one production velocity, the average costs of the increment may be written

$$\frac{Q(x_2, y_1) - Q(x_1, y_1)}{x_2 - x_1}.$$

This expression is compared with average additional revenue, which under our assumption is simply the anticipated price. Average additional costs approach marginal costs as the increment becomes smaller. The same is of course true for total additional costs. Average additional costs for each individual production velocity can be employed in the marginal cost approach to the optimum product vector. For the indifference approach, only total combined additional costs for the whole vector can be used.[76] After the optimum direction is determined, it is impossible and unnecessary to compute average additional costs for individual production velocities.

The use of average or total additional costs instead of marginal costs simplifies many managerial decisions. However, it is still implied that the minimum cost combination for each product vector considered is solved. This, as we know, is a requirement for using the concept of a cost function. No practical difficulties arise from this requirement if no changes of production methods, that is, in the proportion of productive factors used, accompany changes of the product vector. Usually, however, not only changes in direction but also in length require changes in the proportion of factors used.[77] The determination of new total minimum-cost combinations becomes then a major problem. Under such conditions

[76] Total combined additional cost may be written in this case $Q(x_2, y_2) - Q(x_1, y_1)$. Changes of both production velocities, as determined by the curve of optimum direction, are now responsible for the increment in costs.

[77] Cf. footnote 15.

the practical farmer is usually unable to differentiate between the determination of the minimum total cost combination for each product vector and that of the optimum product vector. It is realistic to assume that the farmer does not make a clear differentiation between cost and production functions. He is generally inclined to think in terms of his production function rather than in terms of his cost function. The marginal-productivity approach to the optimum product vector is, therefore, often better suited for problems of farm management than the marginal-cost and the indifference approaches.

Another drawback of the marginal-cost and indifference approaches is the necessity of evaluating all productive factors before cost functions can be used, even in the most simplified approach to the optimum product vector. In agriculture, indirect[78] valuations, which by necessity contain an often rather considerable arbitrary element, play a particularly important role. This is brought about not only by the need of evaluating the large internal movements of materials and services between branches (this need does not exist if only total combined costs are used), but also by the need of evaluating the important portion of labor contributed by the operator and his family and the important movements of materials and services between the farm business and the farm household. The marginal-productivity approach permits dealing with individual productive factors and groups of factors in such a way that evaluation of certain factors or groups can be postponed to a later stage of the analysis without interfering with the preceding ones. Arbitrary elements in indirect valuations do not, therefore, affect the previous stages.

Simplification of the marginal-productivity approach can proceed along the same lines as that of the marginal-cost and indifference approaches. Instead of the value of the marginal product of a unit of each productive factor in each individual production velocity, the value of the average additional product may be compared with the average additional costs (price) of the factor holding other factors and production velocities constant, in the sense of measuring and allowing for their changes. As a further step towards practical applicability of the marginal-productivity approach, account has to be taken of the fact that the farmer is not so much interested in the value product of individual productive

[78] Cf. footnote 49.

factors as in the value product of whole alternative farm-management measures—each of which usually involves changes in many productive factors. Under such conditions the value of the average additional product of a unit of each factor becomes meaningless, and the value of the total additional product of the farm-management measure has to be compared with its total cost. This simplification amounts to an amalgamation of the marginal-cost and marginal-productivity approaches. It is well suited for the thinking of most farmers, however, and is practically useful in spite of the fact that neither the concept of a cost function nor the concept of a production function is clearly preserved.

As a last step in simplifying the marginal-cost and the marginal-productivity approaches, the strict requirement of holding constant all production velocities, with the exception of one, in considering the effects of alternative farm management measures may be dispensed with. The value of the total combined additional product comprises now the effects of the farm-management measure considered upon all production velocities comprising the product vector. Comparison of total combined additional value product of given farm-management measures with the costs of these measures is often the most practical approximation to the determination of the optimum product vector. Although the optimum product vector cannot be determined in this way, save by accident, the modest goal of improving the existing product vector can be effectively pursued.

If the farm-management measures considered are of such importance that they clearly affect many branches, the farmer is inclined to think of his own account in terms of the farm as a whole. If for instance, technological progress in industry has introduced better and cheaper mechanical equipment in grain harvesting, the farmer will ask how a given replacement of animal power by tractor power and of a binder by a combine affect the net revenue of his whole farm rather than the revenue from the grain branch.[79] There are other measures, however, about which the farmer usually thinks in terms of individual branches and not in terms of the farm as a whole. He does this, not because he consciously keeps production velocities in other branches constant, but because he is not suf-

[79] Exceptions, however, occur. Mechanization of individual branches has often proved disastrous because the necessity for a complete reorganization of the whole farm, including size, layout, rotation, variety of crops, livestock system, etc., was not sufficiently realized when the measure was undertaken.

ficiently aware of the joint character of agricultural production. Or, if he is aware, he may not have the tools at hand to deal with the economics of joint production. One such measure is, for instance, changes in the quantities and combination of artificial fertilizers or feeds because of changes in fertilizer and feed prices. Another example is changes in the number of hogs because of changes in the corn/hog price ratio. In such cases emphasis upon total combined additional value product of given measures as a concept in practical approaches to the optimum product vector has educational value.

Finally, some conclusions for farm accounting may be drawn from the theoretical determination of, and practical approximations to, the optimum product vector. Two of the three objectives of farm accounting mentioned above can be passed over because problems of joint production are irrelevant for financial accounting, and because average costs of production accounting is of little use in determining the optimum product vector.[80]

All approaches to the optimum product vector in their theoretical as well as their simplified versions require a thorough knowledge of production functions. This knowledge is obtained from records of physical movements of materials and services between farm and market as well as between different branches of the farm and between the farm business and the farm household. Records of these external and internal movements are usually available because they are needed for current supervision and administration of the farm. The essential further step is to extract pertinent data from currently kept records and to arrange them in statistical tables which may relate to different periods, fields, and operations. Statistics obtained on the farm may be supplemented by statistics from other farms, the agricultural experiment stations, the United States Department of Agriculture, and similar agencies if correction for differences in physical location is to be properly made. These tables of total quantities are the raw material from which data of marginal and additional quantities for the farm as a whole and individual branches are obtained.

In these statistics of input-output relationships, or shortly, production statistics, emphasis is to be placed on the problems of

[80] Use of so-called "flexible cost standards"—that is, a whole schedule of average costs—instead of a fixed and usually fictitious cost standard is of some use in relation to fixed costs, but does not increase the usefulness of average cost of production accounting in relation to joint costs.

process, time, and risk jointness. The problem of process jointness is usually not difficult to take into account in production statistics for reasons already given. The problem of risk jointness has to be approached through records concerning the prevailing weather conditions (temperature, precipitation, freezes, storms), insect pests, and crop conditions at different times of the year (plowing dates, dates of different stages of maturity, water supply). The problem of time jointness is approached through records concerning the timing of inputs of man labor, animal labor, and the services of each type of equipment in the course of the year. Time curves of man labor, for instance, show how many equal efficiency units of different kinds of labor—operator labor, other family labor, permanent hired labor, and seasonal labor—are used during each day or month of the year for each branch and for the farm as a whole. Time curves may appear in two different forms as "historical time curves" and as hypothetical "time requirement curves." The former are not only dependent upon the labor requirement of the different branches but also upon the amount of labor available in the past. A comparison of the two curves indicates "wastage" of labor.

The corollary to production statistics is cost and revenue statistics. Statistical tables of total combined costs and revenues are constructed, from which marginal and additional costs and revenues for the whole farm or individual branches are obtained. This requires only the valuation of the external movements. Internal movements are not evaluated and do not appear, therefore, in cost and revenue statistics. Evaluation of internal movement would require allocation of joint cost, which would make the data meaningless for any approach to the optimum product vector. Statistics of total combined costs and revenues are obtained from data which, in the same way as data for production statistics, are needed for current supervision and administration. Such data may, of course, also be supplemented by data from other farms if the distorting factors mentioned above are to be kept constant.[81]

Statistics of market prices received and paid on the farm are essential for using cost and revenue statistics as well as production statistics. The influence of price changes has to be taken into account in studying past relationships between changes of the product vector on one side and costs and revenues on the other. Past

[81] Cf. footnote 37.

tendencies in price movements are of great interest for the estimates of future prices which are necessary in the use of production statistics.

The great practical value of farm statistics is their flexibility which makes them eminently adaptable to the various approximations to the optimum product vector which were discussed. Besides, farm statistics contain all the elements needed for an accurate determination of the optimum product vector by any of the three theoretically "correct" approaches. Without going into the old controversy about the best system of farm accounting,[82] it may be asserted that accounting systems in joint production should be judged largely on the basis of how cheaply and accurately they furnish farm statistics. This does not imply that farm-accounting systems which are centered around the computation of average costs of production and which regard farm statistics only as by-product are inferior to others not suited for average cost of production accounting. The goal of obtaining average costs of production has forced the double-entry bookkeeping system to such a degree of refinement and to the development of such an elaborate system of protection against errors in entry and computation, that it is "mechanically" superior to some accounting systems that do not aim at average costs of production. Furthermore, the necessity of understanding the relation between different accounts induces a clearer understanding of the complementary and competitive relations between individual branches. Data furnished by the double-entry system, however, in order to be useful raw material for managerial calculations in joint production, must be taken from the books at a stage at which they are not yet deformed by the arbitrariness of indirect valuations and the rigidity of average cost

---

[82] The controversy among agricultural economists about the best system of farm accounting, particularly about the merits of systems aiming at computation of average cost of production, has ranged on the continent of Europe for more than two generations and has created a voluminous literature mostly by German, Swiss, and Scandinavian students. Since the late twenties these problems have received attention in the United States, but to a smaller extent.

Cf. M. K. Bennett, Farm cost studies in the United States. Stanford University, 1928.

J. D. Black, Unit cost of production of farm products, research in farm management, scope and method. Soc. Sci. Res. Council Bul. 13. June, 1932.

M. R. Benedict, The opportunity cost basis of the substitution method in farm management. JOUR. FARM ECON., 14(3): 384–405. July, 1932. Also, 14(4): 541–557. October, 1932.

N. Jasny, Computation of costs produced in rotation, in: Competition among grains, pp. 560–576. Stanford University, 1940.

of production accounting. It scarcely needs to be emphasized that bookkeeping systems not aiming at the computation of average costs of production can be technically so developed that they furnish farm statistics of the same volume and accuracy as the double-entry system.[83] This is important because the technical skill required by the double-entry system and the expenditure of time and material involved speak in favor of other systems. Once it is agreed that farm statistics are the basic data needed to deal with the economics of joint production, the problem of the best accounting system becomes a rather subordinate one.

RECEIVED MAY 19, 1941

[83] Examples are those developed by E. Laur in Switzerland. Cf. E. Laur, Grundlagen und Methoden der Bewertung, Buchhaltung und Kalkulation in der Landwirtschaft. Berlin, 1928.

CONSERVATION—AN OBJECTIVE OR AN IDEAL?

NEIL W. JOHNSON
Bureau of Agricultural Economics

HOW LONG will legislators continue to appropriate funds for the achievement of conservation without some definite idea of the rate of progress being made—some indication of the amount of conservation being obtained in exchange for the conservation dollar? Farming areas vary in the stage of depletion they have reached before conservation efforts are applied and in the natural ability of the soil to stage a "come-back." As a result, the amount and immediacy of return on the conservation dollar may be expected to vary widely from place to place. In what areas are returns the greatest and what economic justification is there for salvaging areas where returns are inconsequential?

We need, therefore, a more definite idea of how far we have come along the conservation road. How much progress have we made and at what rate are we proceeding? How can we measure progress, however, unless it is against a definite end result or goal? Action is now oriented around the conservation *ideal*. While ideals serve an important function, they are not capable of statement in terms sufficiently tangible and concrete to serve as goals, end results, or bases of measurement.

Our action agencies report the acres of farm land converted to other uses and the nature and extent of adoption of conservation practices. One is at a loss, however, in evaluating these figures, as (1) they are not presented against a background of the total job to be done, and (2) they give no indication of how successful a certain conservation change may have been. As of June 30, 1940, farmers cooperating with the Soil Conservation Service had completed the installation of contour cultivation on nearly four and one-half million acres. This is an impressive total, yet how large does it bulk when measured against all the tilled acres in the United States that would benefit by this practice? Of 500 acres changed from cultivated crops to hay, only 100 acres may fully control erosion because of a poor stand obtained on the 400 acres. In 200 miles of terraces wide variations may exist in effectiveness owing either to the quality of original construction or to the farmer's efficiency in maintenance after the system is in operation. We come then to two very pertinent questions—what are our conservation goals? How can we measure progress toward these more effectively?

Conservation Goals

In a maturing society the conservation ideal makes its appeal to men in all walks of life. While the movement, as applied to agricultural lands, is identified largely with the present Administration, leaders in opposing parties have gone on record as favoring conservation in principle. Conservation however, means different things to different people. What kind of National conservation goal would be formulated if the task were delegated in turn to soil technicians, to rural sociologists, economists, or farmers?

A review of recent literature reflects divergencies in views.[1] These range from "the extension of soil conservation practices to all vulnerable land"[2] to the opinion that "the first concern is people, not soil, and especially people at the bottom of the economic pyramid."[3] To these views must be added those of workers who relate our present rate of use of resources to the nutritional needs of our population, . . . , "the consumption of at least 10 to 20 percent more milk, 10 to 25 per cent more butter, 25 to 70 per cent more tomatoes and citrus fruits, and about twice as much of leafy, green and yellow vegetables would be advantageous to the nutrition of our population."[4]

Others, thinking in broader terms, are considering the current and future demands that are being and will be made on the resources of this Nation to feed a war torn world, speculating on the repercussions these might have on maintaining present gains in conservation and in the achievement of future progress.

While professional people study these aggregate effects, the farmer goes his way—his efforts in the direction of conservation often being sharply limited by the dictates of back taxes, payments on the mortgage, life insurance premiums, and the necessity for maintaining at least the present level of current cash income. The conservation problem, then, has many facets and National goals or

---

[1] See: 1. The foundations of National prosperity; Ely, Hess, Lieth, Carver, pp. 96 and 108.

2. B. R. Allin, Conservation policy. Yearbook of Agriculture, 1938, p. 59.

3. Soil erosion—a critical problem in American agriculture, (Part V of the Supplementary Report of the Land Planning Committee to the National Resources Board), p. 43.

[2] H. H. Bennett and W. C. Lowdermilk, General aspects of the soil-erosion problem. Yearbook of Agriculture, 1938, p. 606.

[3] B. R. Allin, Conservation policy. Yearbook of Agriculture, 1938, p. 56.

[4] Hazel K. Stiebling, Better nutrition as a National goal. Yearbook of Agriculture, 1939, p. 381.

objectives in conservation will be established on a sound basi onlys when factors of many kinds have been carefully considered.[5]

We Lack the Facts

Perhaps the greatest retarding influence in the formulation of definite conservation objectives has been the lack of quantitative information of a kind that could be totaled into a National picture. Sporadic attempts of varying significance have been made to provide these data. Possibly the greatest activity along this line took place during the first few years of the present Administration.

A Nation wide erosion reconnaissance survey was made in 1934 to determine the location and degree of soil depletion. This served to focus attention on the portions of the country where soil depletion was taking its greatest toll. Twenty-three per cent of the land area in the East South Central States was judged to be severely eroded as compared to a tenth of one per cent in New England.[6]

A National study of desirable adjustments in agriculture was undertaken in the summer of 1935 by the Agricultural Adjustment Administration and the Bureau of Agricultural Economics, other Federal agencies and the State agricultural experiment stations cooperating. Research workers in the 48 States were asked to recommend for each type-of-farming area in the Nation, systems of farming or ranching that would tend to prevent or control soil erosion, at the same time encouraging those practices that would result in lower costs of production. The research people also were asked to estimate the probable effects of these recommendations on crop and livestock production, both in short and longer time periods. Attention in this study was deliberately focused upon soil conservation aspects, without giving full consideration to other economic factors involved.[7] These data with subsequent refinements have been useful in shaping the conservation policies of the AAA.

---

[5] This suggests the need for adequate representation of these varied interests and viewpoints in any body charged with the formulation of conservation policy. Out of the give and take of joint discussions objectives or goals can be fashioned behind which the entire forces of Government can ally themselves—cooperating with the farmers of the Nation in a carefully planned and united attack on the factors tending to discourage a provident husbandry.

[6] E. J. Utz and C. E. Kellog, The nature and extent of soil losses. Yearbook of Agriculture, 1938, p. 90, table 3.

[7] O. V. Wells, The regional adjustment project: a summary and suggestions for further work; 49th Annual Convention, Association of Land Grant Colleges and Universities, Washington, D. C., Nov. 20, 1935.

By 1936 the Land Planning Committee of the National Resources Board had published a supplementary report in eleven parts dealing with various phases of land planning, many of which would need consideration in any comprehensive formulation of conservation policies and objectives.

These reports include contributions from a multitude of State and Federal agencies and probably represent the broadest over-all effort to date on the part of professional people to inventory and make available basic facts and current thinking on land planning. The titles of these 11 publications give some indication of the field that was covered.[8] The qualitative discussions in these reports disclose a good understanding of problems by regions and areas, but quantitative data available at the time were fragmentary and preliminary in nature. During the past 5 years a considerable body of additional quantitative data have been accumulated by the Soil Conservation Service, the Agricultural Adjustment Administration, the Agricultural Census, the Extension Service and other agencies. This should permit a closer approximation to the definite and specific picture that is needed. Even yet however, there probably are large gaps in the National picture, and it is high time new attempts were made to reappraise our data, and to lay plans for obtaining needed items not now available.

Elements of the Needed Yardstick

What then, are some of the characteristics of the quantitative picture that is needed to give greater objectivity to conservation goals—to transform the conservation ideal into a definite and specific objective against which progress can be measured? The Yearbook of Agriculture for 1938 carried a table showing (1) the acreage of land suited to cultivation under present farm practices and (2) the acreage suited to cultivation under the best conserva-

[8] Part I. General conditions and tendencies influencing the Nation's land requirements.
Part II. Agricultural exports in relation to land policy.
Part III. Agricultural land requirements and available resources.
Part IV. Land available for agriculture through reclamation.
Part V. The problem of soil erosion.
Part VI. Maladjustments in land use.
Part VII. Certain aspects of land problems and government land policies.
Part VIII. Forest land resources, requirements, problems, and policy.
Part IX. Planning for wildlife in the United States.
Part X. Indian land tenure, economic status, and population trends.
Part XI. Recreational use of land in the United States.

tion practices.[9] These data were reported for 9 large regions and for the Nation as a whole. The many times reference has been made to this table in subsequent articles bears testimony to the usefulness of such estimates. But figures for such large geographic divisions can only be of limited use. The data would satisfy the needs of an ever expanding group of users if they could be presented for much smaller subdivisions, such as States, counties, type-of-farming areas, watersheds and conservation districts. It is probable that at the time this table was prepared the reconnaissance nature of the survey would not permit this. It is time, however, to reexamine these data and develop the more specific picture so urgently needed.

This table indicates the acreage suitable for cultivation under present practices and an additional acreage that could be cropped if the "best soil conservation practices" were adopted. Here again is an urgent need for more definiteness in localized areas. Just what are these "best practices" for Sanborn County or for the Mud Creek Conservation District? How many acres should be thrown into rotations, contour strip cropped, or terraced? What are the probable effects of these practices on crop yields? With wide variations in soils on the same farm, in the skill of farm operators, in climatic conditions and in application of multiple versus single practices, it is possible to build up an excellent case for failure to provide these estimates. On the other hand, it is unthinkable that at least rough indications of probable yield effects cannot be provided after 8 years of operation of conservation programs touching farmers over the entire Nation. What is needed as a guide for action is, not so much a final figure down to the third decimal point, but a fairly reliable indication of the direction of change likely to be introduced by the application of conservation practices. This should be supplemented by the best estimates of conservation technicians as to whether the change would be as much as 5 per cent, 10 per cent or 15 per cent above or below yields now being experienced.

Adjustment of the Physical to the Economic and Social

These estimates of desirable physical changes would of course be subject to at least two types of reconciliation. Changes must

[9] E. J. Utz and C. E. Kellogg, The nature and extent of soil losses. Yearbook of Agriculture, 1938, p. 95, table 4.

finally be made within the framework of existing operating units—the source of family farm income. What seems physically best for the area therefore, is subject to adjustment to fit the economic and social limitations found under highly variable conditions of farms and farmers. Sometimes this means merely the choice of one of a number of different alternatives that may be available in achieving conservation goals. In other instances these alternatives may be so few as to hamper seriously adoption of a conserving system of farming. In any event, reality is injected into conservation programs only when adequate consideration has been given to their adaptability when applied to the individual farm.

In addition to fitting the conservation plan to the farm we have the more difficult job of fitting the resulting farm production to the needs of the area, the region and the Nation. Indeed, in times like these, we are compelled to recognize needs far beyond our own boundaries. This, in turn, makes even more necessary careful determination of: (1) how much of these needs we can meet without jeopardizing our own National welfare, and (2) what areas can supply these needs with the least loss of soil and human resources. Economic, sociological, National, and world-wide needs—present and future—must all be taken into account. Such factors as the total area needed for supplying our own food requirements and our share of the needs of other nations, the supply-price relationships that prevail in different regions, the amount of land needed to provide a desirable pattern of agricultural population, the acreage needed to provide a retreat for the unemployed or incapacitated (if it is accepted that agriculture must continue to act as the shock absorber), these and many other factors need careful attention as the basis for future agricultural and conservation policy.[10]

The Farm Plan as a Necessary Segment

Completion of the desirable physical appraisal then, would be a first step in developing a concrete pattern for action. But, as previously suggested, planning activity to date has too frequently stopped short of considerations on the individual farm. The very enormity of the task has probably been the chief deterrent, rather than failure to recognize that this after all is the level where plans are finally put into effect. At the turn of the year less than one

[10] See Neil W. Johnson, Analysis of the present program of research in the economics of soil conservation and suggestions for its improvement. U.S.D.A. Mimeograph, pp. 27–33, for additional factors on which work is needed.

farm in six was operating on the basis of some type of farm plan. Prior to the development of Federal programs to assist agriculture this number was very much smaller.

State and Federal agencies are cooperating this year in developing a coordinated approach to individual farm planning. This is designed to assist the majority of our farmers in making a start in the development of plans looking toward the best use of their land field by field, with the goals in mind of soil conservation and maintenance or improvement of farm family living. This process, being tried in an experimental way in five States, envisions the development of a long-time plan for each farm to furnish direction and purpose for the current year's plans.[11] The farmer and the Federal action programs with which he is associated thus unite year by year in driving toward the long-time goal for each individual farm. This experiment in application of a very extensive type of farm planning, if successful, may be applied on a national scale. It may eventually become a source from which it will be possible to total desirable adjustments on individual farms into area, regional, and National goals.

It is recognized that the sum total of physical adjustments that seem desirable on individual farms may not coincide with what seems desirable as conservation goals for the area, the region, or the Nation. Fears have been voiced that surpluses of hay and forage crops would become evident, followed by an inevitable expansion of livestock enterprises in areas offering serious competition to those already engaged in these lines. The capacity of certain deficit areas to absorb increasing quantities of these products for home consumption and the current demands for livestock products for the armies of the democracies have lulled these fears for the present. They serve, however, to illustrate the concern that is evidenced when National programs accelerate changes in traditional methods of farming.

Where wide differences between the needs of the individual and society seem likely to occur, group meetings and other educational devices are desirable to reconcile viewpoints. Greatest realism probably will result in planning when the process proceeds on farm and national levels simultaneously, with frequent cross checking to serve as guide-posts to reality. Planning that neglects the unit

[11] U.S.D.A. Mimeograph, A coordinated approach to individual farm planning, (Report of an Interbureau Coordinating Committee on Individual Farm Planning). The states are Kansas, South Dakota, New York, Virginia, and Ohio; each having one experimental county.

on which plans are to be translated into action is doomed to failure at the outset.

Furthermore, the plan at the farm level must be not an FSA, an SCS, an AAA or other plan, but *the farm plan* prepared largely *by* or *with* the farmer, and not *for* him.[12] The farm plan thus assumes new importance in the eyes of both the farmer and the representatives of the action agencies with whom he deals. It becomes the instrument through which unification of objectives is achieved and all forces marshaled for progress toward definite and specific goals. The quality of farm plans prepared on such a wholesale scale will of course vary with the training and ability of farmers and the types and quality of assistance they are able to obtain in preparing both long-time plans and those for current years. These first plans would be considered as approximations subject to modification and improvement to meet changing conditions through the years.

Other Alternative Approaches

As previously indicated, the task of developing farm plans on more than 6 million farms within a relatively short period seems almost insurmountable. The furnishing of immediate technical assistance to any such number is out of the question. In addition to or as part of the extensive approach described above, distinct possibilities are inherent in various group approaches to individual farm planning. Explorations in these fields have already been made by a number of agencies doing farm planning work. As developed by the SCS, the approach involves explaining to the group the nature of the erosion problem, the alternatives for land use, soil treatments, and erosion control practices applicable to the several classes of land and the economic factors affecting farm conservation plans. The application of the program to an individual farm is illustrated by discussion of a typical farm and its conservation problems and program, usually putting a farm known to the group on the blackboard. Conservation maps and planning forms are then furnished, and the farmer invited to carry these as far as possible at home prior to the visit of the technician.

Farmers vary in their ability to prepare plans entirely unaided, but the method outlined does result in reaching more farmers at less cost per plan. This especially is true where thought has been

[12] This does not preclude the use of technical assistance but recognizes that the farmers' desires and needs must be taken into account if the plan proves workable and that technicians are too few to reach the great majority of our farmers in the very near future.

given to grouping farms according to their similarity in adjustment problems—subsequent meetings calling together only farmers identified with the group and orienting the discussion around problems and cases that the members of the group all recognize.

Sometimes meetings of this sort can combine considerations on both the area and individual farm level in an effective way. One adaptation of this method is visualized more readily as the items might appear on the school house blackboard.[13]

Analysis of _____ (Number) _____ (Kind)* farms in _____ (Locate specifically)

Present condition	Important items to be considered in changing	Changes that seem feasible	What these changes will mean
Farm Organization	*The Land Use*	A.	*On a typical farm of the group*
	Crops:		A.
			B.
Farm Operation		B.	C.
	Pastures:		D.
		C.	
Returns from farming			*On all farms of the group*
	Woodlands:	D.	A.
			B.
	The Livestock Organization		C.
		E.	D.

* Describe in physical and economic terms that make the group an entity with common problems; that is small corn-hog farms on rolling land, large wheat farms on blow soils, one-mule cotton farms on bottom land, etc.

Attention might be directed first to the present condition of the specific group of farms under discussion. Salient features of the farm organization might be listed and examined for their contributions to stability of farm income. Farm size, for instance, frequently is too small to yield an adequate living even when an exploitive system of farming is followed. Again, farms of adequate size may be organized with almost sole dependence on the income from a soil depleting cash crop.

Current methods of farm operation could be analyzed for their

[13] Developed in collaboration with Norman Munster, Soil Conservation Service, and Kenneth Bachman, Bureau of Agricultural Economics.

effects on soil and water conservation. Yesterday the western wheat farmer took pride in his broad acres of scrupulously clean summer fallow—today this is giving way to such practices as stubble mulching, and cultivation either on the contour or across the direction of prevailing winds is replacing "square farming."

The general range of income expectancy for farms in the group could be determined—the degree of fluctuation from year to year noted and the adequacy of the living standard discussed. Farm planners frequently fail to realize the sharp limits to conservation alternatives that confront the small farmer in many sections of the country. Only as they become conscious of the reasons for the apparent lack of interest in conservation among certain farming groups will they be in a position to render sympathetic and intelligent aid.

Out of these group planning considerations of present conditions will come a realization of the need for making certain changes in the land use (cropland, pasture and woodland) and livestock organization of the farm. Many of the changes first advanced will for one reason or another be found impractical, but some will seem feasible for adoption on most of the farms in the group. The process is not complete until the group has thought through to what these changes will mean (1) on the individual farm of the group, and (2) to the area if the changes are put in effect on most of the farms of the group. It aids in determining kinds and directions of changes rather than absolute amounts and, like any other forecasting procedure, is subject to frequent re-checking as the opportunity presents itself.[14]

To many this process will seem disarmingly simple, until a sincere attempt is made to apply it with a specific group of farmers, confronted with similar adjustment problems. Surprising gaps will be revealed in what should be common knowledge if we are to deal effectively with current day farm problems. To begin with, the process assumes that we already know something about the similarities and differences among farms in a given locality, their physical as well as their economic and social characteristics.

It further assumes that this knowledge will not have been overwhelming and confusing, but that out of the welter of heterogeneity it will have been possible to sort farms into roughly homoge-

[14] This process does not presume that the best use of the farmer's resources will be immediately apparent from the group discussions. It should however, produce a background of understanding that will enable the farmer, either with or without assistance, to develop a farm plan better suited to his own peculiar needs.

neous groups where production problems and adjustment opportunities exhibit at least some degree of similarity. Much of our past research is ineffective in meeting the problems of farmers today because we have failed to differentiate between groups of farmers who "speak different languages," with the result that our generalizations have applied to no one in particular.

It assumes that having differentiated these "strikingly different" groups, we have studied the farms in each till we know something of how they are organized and operated and what opportunities or hindrances tend to influence the achievement of stable incomes and the conservation of soil resources.[15]

More specifically, it assumes that the various alternatives available to each important farm group will have been studied, their probable effects assessed, and the more promising developed for farmer consideration.

Thus what appears to be a simple extension approach is revealed as a clearcut demand for the very specific results of research. To be sure, the process would have value as a means of focusing attention on the problems of specific groups of farms without the assistance of research findings for the group. Such meetings, however, might be expected to formulate questions rather than to develop specific programs upon which farmer members of the group could confidently move forward.

Workers in many States may tend to reject the practicality of this approach, pointing out that few research results have been compiled to meet the needs of specific groups. Research projects set up now, they would say, could be expected to yield results only after the need had passed. It is the belief of the author, however, that much of our past research and the experience accumulated by workers in State and Federal institutions could be marshaled rather rapidly to meet these new needs.

Many of the results of research in the physical, economic, and social fields need only "repackaging" in more readily usable form. The generalization can become specific when we think in terms of the application to and by the specific group. This "repackaging" process necessarily would blend the physical with the social and

[15] The term "strikingly different," coined by George Collier of the Soil Conservation Service, is used advisedly to emphasize the need in actual practice of keeping the number of groups studied to a minimum. It implies groups readily recognized by the county agent and the farmer as having common problems. It appreciates the practical necessity of the technician confining himself to the detailed study of only the more important groups.

economic. Only thus can research workers approach farmers' problems with the reality that makes for effective solution. Further reality and greater assurance of success will come when the farm group in question assists the technician in developing acceptable solutions to its problems.

It is only through some such process of individual or group planning that we can hope to reflect the aggregate of farmer intentions on the areal, the regional, and the National basis. Such information could well become a significant guide in the shaping of National agricultural policy. It could indicate the areas where farmers were making desirable adjustments unaided as opposed to those where Federal assistance might be more justified. It could reveal localities where current trends foretell serious future maladjustments, enabling State and Federal agricultural workers to render increasingly effective assistance along many lines "before the horse is stolen."

What has been said is sufficient to indicate the probability of gaining a much more specific idea of our definite objectives in conservation now than at any time in the past. Eight years of conservation work on farms has been experienced, and methodology is available for doing the job on the level of the individual farm, groups of similar farms, the area, region, and Nation. Once objectives are clearly defined the task of measuring progress toward these ends will present itself.

Problems in Measuring Progress

Not all those changing to soil-conserving systems of farming participate in the programs of the Soil Conservation Service or the Agricultural Adjustment Administration. A fairly complete check on progress must therefore make some provision for including changes made on non-participating farms. Both conservation programs have given some attention to reporting these changes and an expansion of these efforts, together with observations through the Extension Service, probably offer greatest profit for the immediate future. The sample census, being experimented with in several States,[16] and the current year and long-time plans contemplated in

[16] Reference is to obtaining data periodically from farms by the stratified-random method of sampling. See W. D. Goodsell, R. J. Jessen and W. W. Wilcox, Procedures which increase the usefulness of farm management research. JOUR. FARM ECON., 22(4): 753–761, 1940. State and Federal agencies cooperate in these studies in Iowa, Arkansas, Kansas and North Carolina, the work in Iowa having been most intensive to date.

the coordinated approach to individual farm planning previously described, have distinct possibilities as further checks on the amount of progress.

The amount of progress, however, may be misleading unless we know something of its quality. This, of course, eventually reflects itself upon the yields of subsequent crops but usually only after a lag of several years during which other variables such as weather extremes and efficiency in management have also exerted an influence. The physical evidences of current erosion are apparent to those trained to recognize them, however, and it should be possible to obtain at least rough measures of the effectiveness of changes made in land use to control erosion and in the practices adopted and reported as the achievements of a conservation program. Possibly some type of conservation appraisal committee should be developed in local communities from the standpoint of furnishing a truer picture of progress or the lack of it.[17] Such a committee might become the focal point for discussions leading to the improvement of conservation practices and the obtaining of more real conservation on farms. Farmers showing especial skill in conserving soil might be recognized as "master conservationists" in much the same way our "master farmers" achieve some measure of distinction.[18]

At least two major Federal programs for agriculture have by name and nature a major stake in achieving conservation on the farm. In many areas the AAA program assists farmers to adopt the conservation practices recommended by the SCS. In some localities, however, the blanket approach of the AAA has not yet been adapted to the needs of individual farms. As a result, land remains in undesirable uses to preserve the acreage base on some cash crop for which the land is no longer suited.

Needed is a frank examination into ways and means of marshaling our conservation forces for united and effective effort on the individual farm, locality by locality throughout the Nation. A first requirement is mutual agreement between action agencies and farmers upon the kinds and amounts of adjustment in land use and practices that will obtain a desirable degree of conservation. Having thus crystallized objectives there remains the task of assisting the

---

[17] This committee might be composed largely of farmer members of soil conservation districts or county land use planning groups together with soils technicians who would assist in interpreting the physical evidences.

[18] This idea contributed by R. D. Jennings, Bureau of Agricultural Economics.

farmer to put them into effect with a minimum of lost motion and a maximum of economy. Coordinated farm planning may supply one valuable tool for this effort. Another may be the development of a uniform system of reporting conservation progress so the contributions of each agency to this end could readily become part of regional and National goals.

The whole task of defining conservation objectives and moving up on their achievement should, however, become much more than an accounting chore. Discovery of the factors responsible for unusual progress and assessing the importance of various hindrances in local areas can become the highly significant contributions of the conservation economist.

This paper may possibly serve to point out the need for clearer definition of our conservation goals—making them more objective and hence more justifiable. The suggestions that have been made for accomplishing this end are admittedly incomplete. Effective work along these lines would involve the united and continued effort of working committees of representatives of the action and planning agencies of the Department of Agriculture and the States as well as considerable participation from farmer groups throughout the Nation.

There is deep concern just now because the American economy, forced into high gear to meet a war emergency, may suffer serious dislocation when there is less need for frenzied efforts to supply the machinery of destruction. The need for current post war planning and the careful cataloging of worthwhile public works, as partial outlets for excess capacity, is making headlines of its own. We can expect that countless projects will be offered, under the guise of the conservation ideal, as being worthy of the expenditure of public funds. It seems timely, therefore, that the more specific inventorying process suggested here be undertaken; probjects already a part of definite conservation objectives being advanced, and the public welfare rather than political expediency being served.

RECEIVED JUNE 25, 1941

RECENT DEVELOPMENTS AMONG FARM LABOR UNIONS

HARRY SCHWARTZ
Brooklyn College

THE MOUNTING defense employment in the summer of 1941 imposed a tremendous strain on this nation's labor supply, and had widespread repercussions among those who labor for wages in the fields of our Democracy. As the traditional surpluses of farm workers disappeared in many areas and farmers encountered relative scarcity of help, wages rose and the bargaining positions of these workers improved. It is during such a period that one might expect unions of farm workers to gain substantial strength and play an important role in the agricultural labor market. In general, this did not occur during the period we are considering, and most farm labor unions were at a comparatively low point in their fortunes as compared to the middle and late 1930's.

During this summer, this writer had the opportunity to visit many of the agricultural regions in this country.* Having earlier noted the paucity of information on the current status of farm worker organization, he made a special effort to visit local unions in the field and to interview union officials, government employees, and others familiar with the actual day to day activities of these groups.† Based on the information so obtained—as well as upon certain union documents which have only recently become available —this report attempts to summarize the most important developments of the past two years in this field, and particularly to indicate the reasons for the relative failure of these agricultural labor unions to utilize the defense effort's impact on the labor market for their own substantial advancement. Since they are readily available, the

* The field research on which this essay is based was financed through the generosity of the Columbia University Council for Research in the Social Sciences. The Council's grant was made to enable the writer to gather materials for a study of farm labor on which he is collaborating with Prof. Harry J. Carman and Dr. Carl T. Schmidt of Columbia University.

† Among the many who aided the author, special gratitude is due to the following: J. R. Butler and David Griffin of the Southern Tenant Farmers Union; Paul Gardner, Frank Lopez, Luisa Moreno, Mary Huggins, and Irwin Abrams of the United Cannery, Agricultural, Packing and Allied Workers of America; Prof. Murray R. Benedict of the University of California; Prof. Stuart M. Jamieson of Hobart College; C. E. Hazard and Edward L. Rutledge of the Farm Security Administration; and Dr. J. Edwin Sharp of the Denver Workers Education Project of the WPA. The author's wife aided materially in the research and field investigation which provided the material for this article.

salient facts regarding the pre-1939 development of these organizations will not be reviewed here.[1]

When it was formed in July 1937, the United Cannery, Agricultural, packing, and Allied Workers of America (UCAPAWA, for short), was primarily a union of farm workers. It had only a few locals and members engaged in canning, processing and related activities. The picture today, however, is quite the opposite. Organizational activities in agriculture have failed to produce a strong, stable membership of field workers. The low wages and general poverty of these laborers has made it impossible for them to form and maintain self-supporting organizations. Many of these workers are migratory and it is difficult to keep them attached to an organization, even if they once join. The great heterogeneity of racial groups forming the farm labor supply in many areas has made for distrust and conflict among different groups of workers, rather than for cooperation, in most cases. The Associated Farmers and other employer groups have vigorously opposed organization of their employees, and have been successful in defeating strikes and other manifestations of concerted worker action. Internal dissension in the union—particularly in the South—has further weakened UCAPAWA's efforts. For all these reasons and others, the progress of farm worker unionization has been slow and has been marked by frequent reversals of fortune.[2] Meanwhile, however, UCAPAWA's organizers found a much more congenial sphere of activity among the industrialized workers in canning and processing plants throughout the country. These had higher wages; they were much less migratory; they worked in fairly large plants where several hundreds or thousands could be reached easily for propaganda purposes; and they did not have as many or as intense racial conflicts in the working force. All this made it easier to organize them and achieve successes.

By the end of 1940, therefore, UCAPAWA found that though 168[3] of its 245 chartered locals were composed of farm workers, only

---

[1] See W. H. Spiegel, Trade unions in agriculture, Rural Sociology, 6(2): 117–125, June 1941; and Harry Schwartz, Organizational problems of agricultural labor unions, JOUR. FARM ECON., 23(2): 456–466, May 1941. J. C. Folsom's testimony before the La Follette Committee, contained in its supplementary hearings on farm labor, is also interesting in regard to the historical background of the developments discussed above.

[2] For a more detailed discussion of UCAPAWA's difficulties and problems, see the author's article, op. cit

[3] The breakdown of these chartered locals by branches of agriculture was as follows: 86 sharecropper; 39 fruit and vegetable; 34 sugar beet; and 9 poultry and dairy. Proceedings, Third National Convention UCAPAWA, CIO, 1940, p. 18. No

71 of these were in good standing, as against 68 locals of non-farm workers in good standing of the 77 chartered. Moreover, 70 per cent of UCAPAWA's total income was supplied by 23 locals in 17 cities, all composed of workers in fields other than agriculture.[4]

Not only were the farm worker locals a negligible source of income for UCAPAWA, they were actually a financial burden. From Dec. 1, 1938 to Nov. 30, 1940, over $18,000 was spent for organizazational activities among them, but little more than $6,000 was collected from them in initiation fees and dues. Here was the crux of the situation: UCAPAWA was spending three times as much to organize them as they contributed. No union can long keep on that path. That such activity was continued for as long as it was can be traced to the fact that sympathetic individuals and organizations contributed over $11,000 during this period for the purpose of organizing these workers. But even with this help UCAPAWA spent about $700 more than it received, a substantial sum for a union so weak in financial resources.[5] Moreover, outside contributions cannot be depended on and had already in 1940 shown clear signs of slackening substantially.

Faced by relative failure of their efforts in agriculture and becoming ever more impressed by the opportunities to organize canning and processing workers, UCAPAWA's leaders naturally began devoting more and more attention and effort to this formerly subsidiary field. This new direction of the union's work was officially ratified at the 1940 convention. It was decided to concentrate the union's efforts on key cities and regions where a large potential membership for the union exists within a relatively limited territory, preferably working in an industry which is not so highly seasonal that it requires a migratory and unstable labor force. No longer will the union scatter its energies by trying to organize many small groups over large areas, as it did among farm workers in California and in the Rocky Mountain beet states. For the present and immediate future, therefore, UCAPAWA is concentrating on the industrial workers under its jurisdiction. When it has built a substantial base among them, it hopes to go back to the fields and or-

estimate of membership was given, and, in fact, it was emphasized that agricultural membership was a most fluctuating and meaningless quantity because of the different conditions existing in farm areas as compared with industrial regions. The locals collected under the share cropper heading undoubtedly included many day laborers.

[4] Ibid., pp. 8, 10.

[5] The complete financial story as regards UCAPAWA and farm labor is given in Ibid., p. 22.

ganize farm workers effectively. Except for the South, most new organizational work among farm workers has been stopped and most existing locals in this field are struggling along as best they can, hoping to continue alive until UCAPAWA can once again turn its main attention to them.

California—the birthplace of modern farm worker unionism to a large extent—provides abundant evidence of UCAPAWA weakness in the past and its recent cessation of organizing. From 1937 to 1940, the union devoted a good deal of its energies and finances to this promising field. But few of its locals ever attained any great stability. Many of the strikes which were attributed to the UCAPAWA were actually of spontaneous origin, and the union did not enter them until after they had been called. It became one of UCAPAWA's organizers' chief complaints that they knew nothing of an unsatisfactory working situation until a delegation of workers came to headquarters to say they were on strike and to request UCAPAWA aid. This was always given, but was usually fruitless since most of these strikes were lost, having been inadequately planned and having been called only when worker resentment rose high enough. Even the strike of 15,000 cotton pickers in the San Joaquin Valley in 1939 was to a large extent a spontaneous affair which UCAPAWA leaders considered a Frankenstein because of its lack of organization.

With the decision to withdraw from the farm labor field for the time being taking effect, UCAPAWA has almost stopped propaganda work among field laborers in most California areas. At Ventura in January 1941, for instance, CIO organizers did carry on some agitation, but they soon stepped out of the picture and asked the AFL to take over. It did and organized a strike of several hundred lemon pickers which was unsuccessful. In late July 1941, a UCAPAWA local called a cotton wage conference at Madera in San Joaquin County where the union had led the strike of 15,000 cotton pickers two years before. Although all UCAPAWA locals and friends in the Valley had been invited, only ten people showed up and the conference had to be abandoned. A further cause and sign of weakness has been the demise of almost all the California groups formed to mobilize the funds and prestige of urban liberals for farm labor union activities. The end of activity by the Simon J. Lubin Society is particularly noteworthy in this connection.[6]

[6] A significant index of UCAPAWA's withdrawal from the farm labor field in California is to be found in the fact that most of its chief organizers such as Ted

Some UCAPAWA strength still exists among the lettuce packers who work at Salinas most of the year and migrate to the Imperial Valley or Yuma, Arizona for the winter. In the latter area, the union was able to sign several contracts with shed owners during 1940. In the Los Angeles milkshed, UCAPAWA has contracts covering the employees of several dairy farms.

The AFL in Farm Labor Field

After a period of almost complete inactivity, the AFL has once more become active in California farm labor organization and has made important strides since 1939. Federation work in this field dates back at least to 1909, and from 1932–37 most local farm worker unions belonged to it. The AFL's refusal to grant a national charter to these groups resulted in the formation of UCAPAWA and its affiliation to the CIO. The last two years have seen Federation-paid organizers being sent into this field and they have been successful in organizing several locals which are directly affiliated with the national organization under federal labor union charters. A key Federation advantage here has been its grip on the teamsters who control much of the flow of farm produce to market. AFL strength in many canneries has also been important. These strategic advantages have been utilized at times to fight UCAPAWA, and successfully so. In several cases growers have been deterred from signing contracts with or recognizing UCAPAWA because of AFL threats that such action would prevent their products from reaching market or being canned.

The Teamsters Union has branched out and taken in as members agricultural workers far removed from teamster work as usually defined. In both the Los Angeles and San Francisco milksheds, several dairy farms have signed contracts with a local of the Teamsters Union which includes milkers and all other dairy employees. An organizational drive by this group in the summer of 1941 almost brought to a halt the delivery of San Francisco's milk supply as farmers threatened a strike to counter teamster picketing of and refusal to haul milk from non-union dairies.[7]

Rasmussen, Luke Hinman, and Wyman Hicks, are no longer connected with the union, while Luisa Moreno, formerly the chief UCAPAWA organizer among Spanish speaking farm workers, has been assigned to work with canning and processing workers in the Los Angeles area. Leif Dahl, formerly UCAPAWA's top notch farm worker organizer in the country, has not been with the union since the beginning of 1941.

[7] San Francisco Chronicle, August 5, 1941.

Perhaps the most significant development in the California field recently has been the birth and growth of FALA, formerly known as the Filipino Agricultural Laborers Association and now as the Federated Agricultural Laborers Association. Composed almost entirely of Filipino farm workers around Stockton, Sacramento and other California cities, this union has won several important strikes, gaining union recognition, wage increases, improved conditions, and written contracts. The union has saved thousands of dollars for its members by calling the attention of the authorities to the practice of some farmers who deducted workmen's compensation payments from their employees' salaries, in defiance of statutory provisions.[8]

FALA was organized at Stockton in April 1939 when the Filipino asparagus workers there were faced with a wage cut. Under the guidance of the late Hon. Francisco Varona, Labor Assistant to the Philipino Resident Commissioner in Washington, the union was formed and 6,000 workers walked out. The growers soon capitulated and rescinded the cut. Spurred on by this success the union soon spread to other points where it also made gains for the "stoop workers" who compose it. Frequently it has been aided by both the CIO and the AFL, and it has worked closely with independent unions of other racial groups, particularly the Mexicans and Japanese.

In late 1940, FALA requested and secured a charter as an AFL Federal labor local. This was done in order to gain the aid of the AFL teamsters and canners against the employers, who, FALA leaders believed, were preparing to crush the new union. Since then it has continued to grow, both in membership and in prestige among workers.

Entirely unique in farm labor history have been some of the union's methods of helping its members. Wishing to combat the common disinclination of many Filipino workers to save, FALA has helped form the Philippine Mercantile Association, a cooperative enterprise at Stockton which sells groceries and Philippine Islands products. FALA members have been encouraged to buy shares of stock at $5 each, and in this way the workers have simultaneously been given a stake in an enterprise they patronize, and a means of

[8] Many of the details in this discussion of FALA are taken from the FALA Yearbook issued for its second annual convention, July 7–8, 1940, and from the Filipino Journal of June 30, 1941.

profitably investing their savings. The scope of the Mercantile Association can be judged by the fact that it reported a $40,000 sales total for its first year of business, and also by its recent opening of a branch store. To help build a community center for Stockton's Filipinos, the union collected more than $1,500 from its members, and got the government of the Philippine Islands to donate to the project 40 per cent of the net profits of the Philippine Pavilion of the San Francisco World's Fair.

Perhaps better than any other group, FALA illustrates the success that a homogeneous group of farm workers can achieve if it has capable leadership and a unified membership. The unity has come from the fact that all the Filipino members are of common racial strain, work under similar conditions, and face the same problems. The support of the Philippine Islands' government has also been important in promoting the organization.

In late 1938 UCAPAWA claimed 10,000 members and 41 locals among beet workers of the Rocky Mountain States,[9] but here too great weakness was apparent when the writer visited the area. Clyde Johnson, UCAPAWA organizer for the area since 1939, has been transferred to work with the San Antonio pecan shellers, and at present there is no district office or other centralized organizational and service center in this region. From conversations with CIO officials and government employees, this writer has learned that UCAPAWA's membership in this area may be at most measured in the hundreds and it has few functioning locals here. Failure of the beet workers to pay their dues has prevented the maintenance of an organizational staff adequate to handle the problems, and at present there is little organized activity by these locals. Another reason for the weakness of UCAPAWA here stems back to the repercussions in mid-1939 of the resignation of its organizer in this area, followed by charges of embezzlement and betrayal. The Colorado Committee to Aid Agricultural Workers, once a substantial source of funds and other help, has ceased to function since late 1940. From 1939 to 1941 the chief field of UCAPAWA activity in this region was furnished by the wage hearings held under the Sugar Act of 1937. Here the union presented evidence supporting its demands for minimum wages to be paid workers by growers. The union was also active in attempting to

[9] UCAPAWA Yearbook, 1938, pp. 14–15. Issued for the second convention of UCAPAWA held in San Francisco.

secure relief for its members from WPA, FSA, and other agencies.

Only in the South is UCAPAWA still functioning on an important scale among farm workers, and it is in this area that the union at present maintains its only paid organizers among farm workers.[10] Union influence is strongest in Butler County and the surrounding area of Southeast Missouri, and also exists in some parts of Arkansas. In the South, UCAPAWA has been fighting the Southern Tenant Farmers Union (STFU) whose leaders withdrew from UCAPAWA in March 1939. After the split, both sides made a determined effort to salvage as many members as possible, but many locals vanished as their members became tired and bewildered by the factional struggle, and saw no gains accruing from membership. The STFU, which had had 326 locals in 1937 was reduced to about 90 locals in mid-1941, while UCAPAWA claimed 86 locals in December 1940 and had 26 represented at its Southern States Cotton Council Conference at Harviell, Mo. in June 1941. Even together, therefore, the strength of both groups is far below what it was before the split.

UCAPAWA strength in Southeast Missouri is derived from the adherence to it of the Rev. Owen H. Whitfield, who organized and led the sharecropper demonstration of January 1939. Although a Vice-president of STFU at the time, he organized the "Sitdown" movement without consulting its leaders, but instead cooperated with Donald Henderson and the UCAPAWA's supporters. When the split came, his followers remained with the CIO group. Since the termination of the demonstration, Whitfield, cooperating with Federal and State agencies and with urban groups in St. Louis, has been able to form the sharecropper camp at Harviell where the dispossessed sharecroppers have their own community and have improved their conditions materially. Local observers whom this writer has consulted have unanimously praised UCAPAWA for bringing the conditions in this area to public attention so that the remedial steps which have since been taken were made possible.

Most of 1939 and 1940 was spent in repairing the wounds of the split as each group sought to gain primacy and public support. STFU applied for a national AFL charter in the hope of becoming the Federation's agricultural workers union in opposition to the CIO's UCAPAWA, but this was refused. STFU hoped to gain prestige and financial support by AFL affiliation, but that organiza-

[10] UCAPAWA News, August 25, 1941.

tion was reluctant to enter this field where factionalism reigned so bitterly and where the prospects of rapidly building up a stable, dues-paying, and successful organization were slight. Despite the denial of a formal charter, however, the AFL has assured STFU of its moral support, and this may become more substantial when and if the times seem more propitious for organizing the South's farm workers.[11]

During the past two years, both organizations have confined their union activities primarily to seeking aid from local representatives of governmental agencies, and to exerting what informal pressure they can bettering workers' conditions. Their representatives have appeared before the Tolan and other Congressional committees to present the plight of the South's farm workers and to urge steps toward its improvement. Strikes have been avoided until very recently because of lack of funds and weakness of organization.

Since the beginning of 1941 both factions have somewhat accelerated their activities. As this is written they have raised two demands: a price of $1.50 per hundred pounds for picking cotton, and the market price to be paid by landlords for all sharecropper cotton. Both groups have laid plans for strikes, but whether these will be carried out is impossible to say. The STFU has recently begun republishing a printed newspaper, the Tenant Farmer, after having had to content iself with the mimeographed STFU News for some time. All this new activity has derived its strength largely from the defense boom which has drawn workers from the farms into the South's new industrial plants and into the Army.

The relative strength of the two organizations is difficult to estimate. In terms of registered, dues paying membership, both are extremely weak, but their true importance is more properly measured in terms of the number of workers who will follow their leadership in strikes or similar organized protest activities. Judged by the number of locals, STFU has the greater strength and exerts its influence over a wider area than does UCAPAWA, but this may be a misleading criterion. A government official who has spent considerable time in Southeast Missouri has estimated that UCAPAWA has perhaps 6,000–7,000 followers in that area, and if so, this is a group to be reckoned with there. That UCAPAWA has at least a

[11] This account of AFL-STFU negotiations is based upon interviews with J. R. Butler and other STFU officials.

strong nucleus here is further indicated by the national organization's willingness to continue expending funds in this area, although it has largely abandoned farm worker organization in California and the Rocky Mountain states.

Summary

We find in the developments of the past 30 months a significant decline of UCAPAWA's importance in the farm labor field, and the reemergence of a relatively strong AFL movement. If the Federation ever decides to go into farm labor on a large scale, it has the elements of a national union in its California groups and the STFU. But it seems unlikely that AFL leaders will do this in the near future, in view of the CIO's lack of success since 1937. Should the drain of manpower from agriculture continue because of defense needs in the next few years, the present situation may be radically changed. But as yet the drain has been insufficient, and the fundamental obstacles to union organization have been too strong. Government policy, the fortunes of war, the possibility of inflation, the recent rise of farm prices to parity levels, all these and other forces will be important in determining the future of farm labor organization, but their roles are too unpredictable to make forecasting possible in this field.

RECEIVED AUGUST 20, 1941

SHAPE OF TOTAL REVENUE CURVES*

ADOLF KOZLIK†
Iowa State College

RECENTLY THE problem of price discrimination and consumption discrimination of agricultural products with respect to time and to local markets in order to increase agricultural income has been the object of an extended discussion.[1] This discussion was conducted in a highly theoretical way and with reference to inadequate empirical findings.

It was agreed that the shape of the total revenue curve is decisive for the problem of determining how price discrimination would influence the farmers' income, that is, that it is important whether the total revenue curve is convex or concave from above. The returns from sales in several markets—either in one local market at different times or in different local markets at one or at different times—are at an extremum (minimum or maximum) if the marginal returns in all markets are equal. Ordinarily, except in cases of isoelastic demand curves,[2] equal marginal returns in different markets mean discriminating prices in these markets. In cases of isoelastic or identical demand curves such as can be assumed for one market at different times, equal marginal returns mean equal prices in both markets. Whether the extremum of the total revenue reached with equal marginal revenues is a maximum or a minimum depends on whether the total revenue curves in all or at least in a part of the markets are convex or concave from above.[3]

Even if it were certain that total revenue curves are convex and that equalizing marginal revenues would increase total revenue the degree of convexity of the total revenue curves is important in determining the amount of gain from equalizing marginal revenues.

---

* Journal Paper No. J-891 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 710.

† The author acknowledges the helpful criticism and suggestions by R. O. Been and F. V. Waugh of the U.S.D.A., Lloyd Barber, Geoffrey Shepherd, and Gerhard Tintner, Iowa State College.

[1] Frederick V. Waugh, Edgar L. Burtis, and A. F. Wolf, The controlled distribution of a crop among independent markets, Quart. Jour. Econ., pp. 1–41. Nov. 1936. Frederick V. Waugh, Market prorates and social welfare, JOUR. FARM ECON., 20: 402–416, 1938; George J. Stigler, Social welfare and differentiated prices, JOUR. FARM ECON., 20: 573–586, 1938; Geoffrey Shepherd, Price discrimination for agricultural products, JOUR. FARM ECON., 20: 792–806, 1938.

[2] See Joan Robinson: The economics of imperfect competition, p. 42, 1932.

[3] The mathematical conditions are stated in the paper by Waugh and others, pp. 38 f.

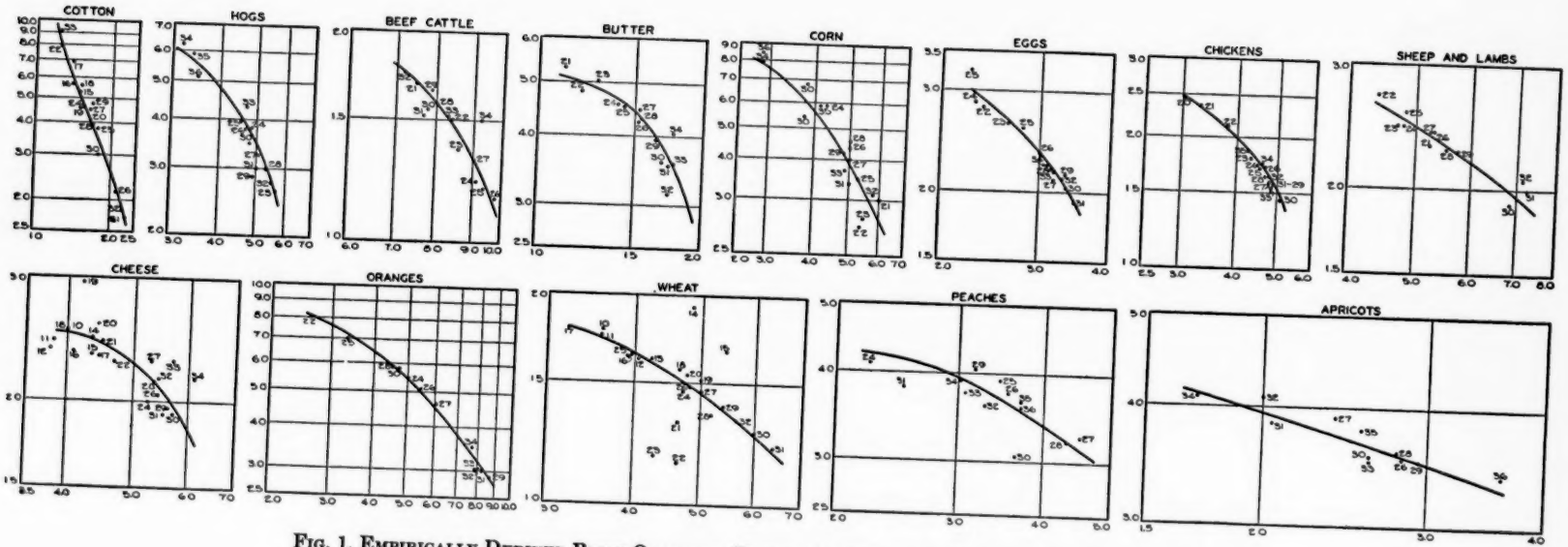


FIG. 1. EMPIRICALLY DERIVED PRICE-QUANTITY (DEMAND) CURVES FOR VARIOUS AGRICULTURAL PRODUCTS.

The shape of total revenue curves is, therefore, very important for such "action programs" as the Ever-Normal Granary, the Food Stamp Plan, Export Dumping, subsidized "New Uses," etc.

Both Waugh[4] and Shepherd[5] referred to empirical findings. Waugh used convex and concave total revenue curves[6] whereas Shepherd tried to point out that nearly all total revenue curves for agricultural products are convex and that, therefore, the discussion of the concavity of total revenue curves, which alone makes price discrimination in time advantageous, is purely academic. Although Shepherd's results are not quite conclusive, he made one step in the direction of bringing the discussion down to empirical facts. I want to go still farther and to show in this article that the discussion of price discrimination has until now been purely academic since almost nothing has been known about the shape of total revenue curves.[7]

As the basis of my argument I choose the demand curves which Shepherd reproduced in his article.[8] The chart is reprinted here in figure 1. It shows that all demand curves are convex on logarithmic scale.[9] From this it would follow that the total revenue curves are convex[10] in their rising part and probably also in their falling part.

Shepherd's statement, however, is correct only if the curvature of the total revenue curves, which are derived from those demand curves is statistically significant. It is the purpose of this paper to show that the curvature of almost all total revenue curves so derived is not significant and hence that no conclusions relating to economic policy can be based upon the curvature. This is probably true not only for the total revenue curves analyzed in this paper, but also for most other empirical total revenue curves derived from statistical demand curves. Shepherd did not claim validity for the shape of the demand curves he represented but stated only that his conclusions would follow from those demand curves.

[4] Waugh and others, op. cit.

[5] Shepherd, op. cit., p. 799.

[6] Loc. cit., p. 11.

[7] It must be acknowledged that Waugh is aware of the danger of errors in the shape of total revenue curves. (Op. cit., p. 13–37.) He does not subject the total revenue curves which he uses to any tests, however.

[8] Shepherd, op. cit., p. 800. There (on p. 808) also the sources for the demand curves are given.

[9] The only exception is the upper part of the demand curve for cotton. But this is determined by the data of one single year (1933) and, for this reason, has to be considered with great caution.

[10] See the author's article: Conditions for demand curves whose curves of total revenue, consumers' surplus, total benefit, and compromise benefit are convex, Econometrica. 1940, 8(3): 268–271.

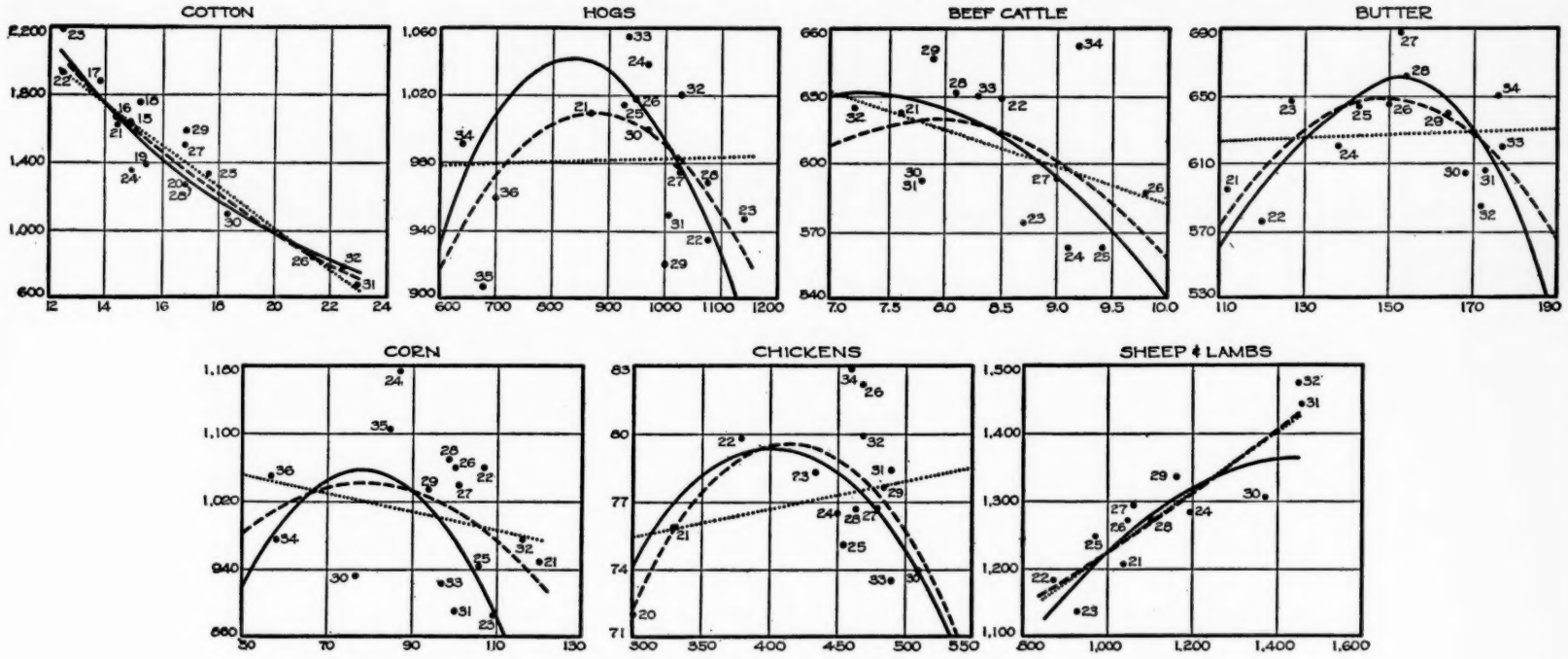


FIG. 2A. EMPIRICALLY DERIVED TOTAL REVENUE-QUANTITY CURVES FOR VARIOUS AGRICULTURAL PRODUCTS.
(REVENUES IN MILLION DOLLARS.)

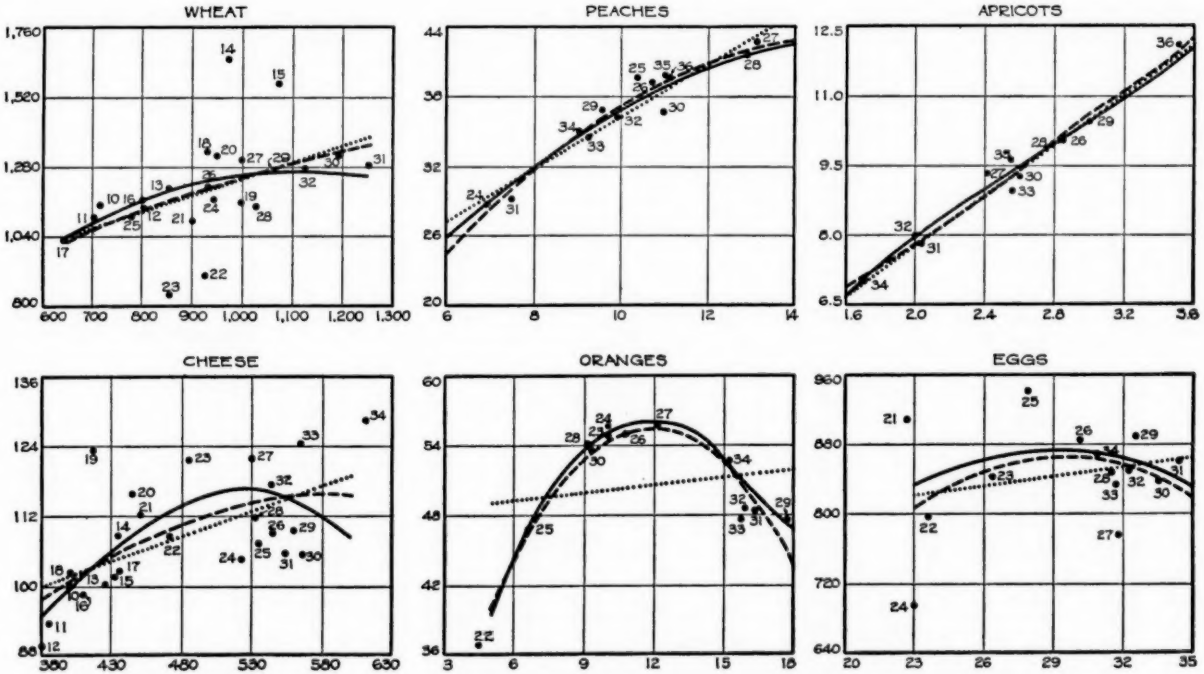


FIG. 2B. EMPIRICALLY DERIVED TOTAL REVENUE-QUANTITY CURVES FOR VARIOUS AGRICULTURAL PRODUCTS.
(REVENUES IN MILLION DOLLARS.)

Utilizing the sources from which Shepherd took his collection of demand curves, the prices which remained after the influence of factors other than the quantities had been eliminated were multiplied with the quantities. The total revenues thus obtained were plotted as shown in the graphs in figure 2. Total revenue curves have been computed from the demand curves in figure 1 and are drawn as full lines in figure 2. Most of these total revenue curves, derived from the demand curves in figure 1, are unreliable for one or more of the following reasons:

(1) They do not fit closely to the scattered dots in figure 2.

There are also so few observations (11–25) and so many variables (2–9) used in the correlation for the derivation of the demand curves upon which the total revenue curves are based that the number of degrees of freedom and the adjusted multiple correlation are very small. In four cases (hogs, beef cattle, corn, and eggs) total revenue curves thus obtained are absolutely unreliable because there is apparently no correlation at all existing between the price, the quantity and the other factors used in the correlation. In five cases (butter, chickens, cheese, oranges, and wheat) the correlation is not significant statistically because with a probability of more than five per cent it may be due to chance. Only in the remaining four cases (cotton, sheep and lambs, peaches, and apricots) is the correlation statistically significant.[11]

The fact of a complete lack of correlation in four out of thirteen cases of empirical demand curves shows how necessary it is to make numerical checks on the significance of the results of graphical correlations.

The correlation tested is the multiple correlation between price, quantity and other factors included in the correlation. The lack of correlation does not indicate that there does not exist a definite relationship between quantity and price or between quantity and

---

[11] From the original data and from the deviations of the dots in figure 2 from the total revenue curves derived from the empirical demand curves the adjusted index of multiple determination for the various commodities was computed by the formula

$$\bar{r}^2 = 1 - \frac{\sigma_d^2}{\sigma_y^2} \cdot \frac{n-1}{n-m}.$$

In this formula $\bar{r}^2$ is the adjusted coefficient of determination, σ_y is the standard deviation of the originals, σ_d is the standard deviation of the residuals, n is the number of observations and m is the number of constants in the regression equation. The actual index is compared with the index beyond which the correlation is significant for a 5 per cent and a one per cent probability of chance.

total revenue; it indicates only that there does not exist a definite relationship between them when the other factors are also taken into consideration. In other words, not the partial regression between quantity and price or total revenue is tested but the multiple correlation between quantity, price or total revenue, and the other

Commodity	Index of determination		
	Actual index	Index for	
		5 per cent level of significance	1 per cent level of significance
Hogs	0.00	0.69	0.79
Beef cattle	0.00	0.53	0.66
Corn	0.00	0.55	0.67
Eggs	0.00	0.53	0.66
Wheat	0.10	0.26	0.37
Butter	0.15	0.53	0.66
Cheese	0.10	0.36	0.47
Chickens	0.23	0.39	0.54
Oranges	0.83	0.96	0.99
Sheep and lambs	0.61	0.60	0.74
Cotton	0.83	0.69	0.78
Peaches	0.91	0.76	0.70
Apricots	0.94	0.75	0.86

factors. For testing the fit of the partial regression curve the coefficient of correlation cannot be used. Instead the X^2-test should be made, since with a horizontal total revenue curve the correlation coefficient is zero even if the fit is perfect.

(2) Even if better fitting curves are drawn through the dots (broken curves in figure 2) the reliability of the total revenue curves judged by the fit does not improve very much. The broken curves in figure 2 represent least squares regression curves of the second degree which have been computed from the dots in figure 2.[12]

As before, in four cases there is no correlation at all, in five cases the correlation is not statistically significant, and only for the same four commodities is the correlation statistically significant, that is, is due to chance with a probability of less than five per cent. In three of these four cases (sheep and lambs, cotton, and apricots) the total revenue curves appear to be concave from above.

[12] The equations of those regression curves and the index of multiple determination computed in the same way as mentioned in footnote 13, for the various commodities are: (R is the total revenue and D is the quantity sold).

(*Footnote continued on page 850*)

(3) In many cases the shape of the total revenue curves is determined by only a few extreme values mostly in subsequent years (hogs: 1934–36; beef cattle: 1926, 1932, 1934; butter: 1921, 1923; corn: 1934, 1936; chickens: 1920–22; eggs: 1921, 1922, 1924; sheep and lambs: 1931, 1932; cheese: 1933, 1934; oranges: 1922, 1925; apricots: 1934, 1936) so that very little reliability can be placed on the results.

(4) In several cases the points are moving in one direction in time, so that the scattering can represent a movement along a time trend as well as a movement along a demand curve (butter, eggs, chickens, sheep and lambs, cheese).

Only in a very few cases can a somewhat reliable total revenue curve be drawn (cotton, peaches, and apricots). But even in some of these cases only the probable slope of the total revenue curve can be given, and nothing can be said with any reliability about the shape of the total revenue curve. The shape of the total revenue curve (full lines) in figure 2 is sometimes purely fortuitous for the following reasons:

Some of the total revenue curves, derived from the empirical demand curves in figure 1, are convex because the demand curve was assumed to be a straight line on arithmetic paper. This is true for beef cattle, corn, eggs, chickens, sheep and lambs, wheat and

(*Footnote continued from page 849*)

Commodity	Regression equation	Index of determination		
		Actual index	Index for 5 per cent level of significance	Index for 1 per cent level of significance
Hogs.....	$R=84+21.10D-0.1202D^2$	0.00	0.69	0.79
Beef cattle.	$R=-271.79+225.404D-14.2429D^2$	0.00	0.56	0.70
Corn.....	$R=609+10.94D-0.0693D^2$	0.00	0.58	0.71
Eggs.....	$R=-389.7+85.320D-1.4492D^2$	0.00	0.53	0.66
Butter.....	$R=-468+15.00D-0.0503D^2$	0.23	0.53	0.66
Chickens...	$R=-17+0.47D-0.0006D^2$	0.25	0.41	0.57
Cheese.....	$R=-18+0.44D-0.0004D^2$	0.23	0.36	0.47
Oranges....	$R=8173+7.887D-0.3311D^2$	0.71	0.96	0.99
Wheat.....	$R=390+1.20D-0.0003D^2$	0.11	0.27	0.38
Sheep and lambs ...	$R=866+0.29D+0.0001D^2$	0.69	0.65	0.78
Cotton.....	$R=5038.27-302.059D+4.9522D^2$	0.84	0.69	0.78
Peaches....	$R=-6.50+6.404D-0.2052D^2$	0.91	0.60	0.74
Apricots....	$R=3.546+1.7915D+0.1736D^2$	0.94	0.75	0.86

peaches. These straight line demand curves are drawn as straight lines not because this fits best, but because this is the simplest kind of a demand curve.[13] The assumption of a straight line demand curve is only one among many possible assumptions; for example a straight line demand curve on a logarithmic scale is also a simple kind of demand curve.[14] It should be noted also that the assumption of a simple straight line demand curve on an arithemtic scale implies the unintentional assumption of a convex total revenue curve;[15] had a simple straight line curve on a logarithmic scale been assumed a particularly shaped total revenue curve,[16] which might be convex, concave, or a straight line, would have been implied.

The shape of the total revenue curve, therefore, is in these cases not derived from the empirical data but from an *a priori* assumption of a particular shape of the demand curve and thereby of the total revenue curve. No importance can, therefore, be placed upon the result of such derived total revenue curves. This eliminates the derived total revenue curves for all commodities for which, because of simplicity, a straight line demand curve on arithmetic scale was assumed. For the same reasons no importance can be placed on the fact that those demand curves appear to be convex on a logarithmic scale (see figure 1 and G. Shepherd: *op. cit.*, p. 199) because this follows from the assumption that the demand curves are straight lines on arithmetic scale.[17]

---

[13] It decreases the degrees of freedom only by one, whereas a curved demand curve would diminish their number by two or more.

[14] Henry Schultz makes both assumptions alternatively:
(1) $p=a-bD$ and
(2) $\log p=a-b \log D$, when p is the price, D the consumption, a and b are positive constants. (The theory and measurement of demand, 1938, p. 151.)

[15] The total revenue curve of the demand curve: $p=a-bD$ is $R=aD-bD^2$ and the corresponding marginal revenue curve is $R'=a-2bD$. R' evidently is falling with increasing D and the total revenue curve is convex ($R''=-2b(<0)$).

[16] The total revenue curve of the demand curve: $\log p=A-b \log D$ (a demand curve of constant elasticity T $1/b$) or $p=a/D^b$ is $R=D \cdot p=a/D^{b-1}$ or $\log R=A-(b-1) \cdot \log D$. This total revenue curve appears as a straight line on logarithmic paper. On arithmetic paper it is a concave curve, convex curve, or a straight line, depending on the elasticity of the demand curve. The marginal revenue curve is: $R'=a(1-b)/D^b$ and $R''=-ab(1-b)/D^{b+1}$. It follows that $R'' \gtreqless 0$ if $1/b$. If the elasticity $1/b \lesseqgtr$ of a straight line demand curve in a logarithmic scale is greater than unity the total revenue curve is rising and convex, if it is unity, the total revenue curve is a horizontal straight line, and if it is smaller than unity the total revenue curve is falling and concave.

[17] The demand curve

$$p = a - bD \text{ takes on logarithmic paper the form}$$
$$\log p = \log (a - bD) \text{ and the derivatives are}$$

It is a well-known fact that the regression lines are different whether one minimizes the sum of the squares of the deviation of one variable or of the other if the correlation is not perfect.[18] For this reason also—apart from the particular assumption of a certain simple shape of the demand curve—it is a more reliable procedure to determine the total revenue curve from a correlation between the actual total revenue in each year and the quantities sold during each year, minimizing thereby the deviations of the total revenues (see broken curves in figure 2) instead of deriving the total revenue curves from the demand curves when the deviations of the prices have been minimized. This, however, is of secondary importance.

Finally the total revenue curves—both the total revenue curves derived from the demand curves in figure 1 (full curves in figure 2) and the total revenue curves computed (broken curves in figure 2)—were subjected to a test for the significance of their curvilinearity.[19]

A linear regression line (dotted lines in figure 2) and the linear correlation[20] were computed for all commodities from the dots in figure 2.

$$\frac{d \log p}{d \log D} = -b \cdot \frac{D}{p} = -b \cdot \frac{e^{\log D}}{e^{\log p}}$$

$$\frac{d^2 \log p}{d(\log D)^2} = -b \cdot \frac{e^{\log p} \cdot e^{\log D} - e^{\log D} \cdot e^{\log p} \cdot \dfrac{d \log p}{d \log D}}{(e^{\log p})^2}$$

$$= -b \cdot \frac{e^{\log D}\left(1 - \dfrac{d \log p}{d \log D}\right)}{e^{\log p}}$$

$$= -b \cdot \frac{D}{p}\left(1 + b \cdot \frac{D}{p}\right) < 0.$$

[18] See Henry Schultz, op. cit., footnote 31, pp. 148 f.

[19] See George W. Snedecor: Statistical methods, 1938, p. 314.

[20] The equations of the regression lines and the correlation coefficients computed as indicated in footnote 11 are:

Commodity	Regression equation	Adjusted coefficient of determination
Hogs	$R=972.33+0.0964D$	0.00
Beef cattle	$R=749.948-16.7843D$	0.00
Corn	$R=1107.41-1.0989D$	0.00
Eggs	$R=737.068+3.6446D$	0.00
Butter	$R=614.40+0.0862D$	0.00
Chickens	$R=71.80-0.0124D$	0.00
Oranges	$R=48.064+0.2101D$	0.00
Wheat	$R=684.6+0.5545D$	0.15
Cheese	$R=67.97+0.0849D$	0.26
Sheep and lambs	$R=774.1+0.4505D$	0.73
Cotton	$R=3523.666-125.9861D$	0.83
Peaches	$R=13.848+2.2542D$	0.87
Apricots	$R=2.4354-2.6858D$	0.96

In order to test the significance of the curvilinearity of the total revenue curves in figure 2 the F-values[21] were computed which show whether a regression curve fits significantly closer to the dots

[21] $F=\frac{Sd_1^2-Sd_c^2}{Sd_c^2/f_c}=f_c(Sd_1^2/Sd_c^2-1)$. (See George W. Snedecor: Statistical methods, 1938, pp. 314 ff.) when d_1 are the deviations from the regression line, d_c are the deviations from the regression curve, f_c are the degrees of freedom for the regression curve, and (f_c+1) are the degrees of freedom for the regression line. The table shows the F-values together with the F-values for the 5 per cent and the 1 per cent level. (No $F<1$ is significant.)

Commodity	Full curves			Broken curves		
	Actual F	F for 5 per cent level of significance	F for 1 per cent level of significance	Actual F	F for 5 per cent level of significance	F for 1 per cent level of significance
Beef Cattle	−1.4026			−0.3328		
Sheep and Lambs	−2.8545			−0.0482		
Apricots	−0.7749			−0.4687		
Cheese	−2.6092			0.4803		
Wheat	−1.0281			0.0909		
Eggs	0.2301			0.8577		
Corn	−3.7353			1.2114	4.96	10.04
Hogs	0.3620			4.1629	5.12	10.56
Cotton	0.5004			1.5629	4.96	10.04
Butter	4.9049	4.96	10.04	6.6093	4.96	10.04
Chickens	4.0039	(see below)		7.0167	4.84	9.65
Peaches	3.8579	(see below)		5.6728	5.32	11.26
Oranges	65.8165	10.13	34.12	37.8501	10.13	34.12

The improvement in correlation through using a curve rather than a line can be tested conclusively by the F-test only if it is based upon the partial correlation coefficient and not the coefficient of part correlation which has been used here. Thus the above use of the F-test gives valid results only if the part correlation coefficient appears non-significant.

In those cases where the total revenue curve is derived from a straight line demand curve the F-test cannot be used for determining whether the curvilinearity is significant because both the total revenue line and the total revenue curve based upon a straight line demand curve have the same number of degrees of freedom. In this case Fisher's z-test (R. A. Fisher, Statistical methods for research workers, 3d ed. 1930, p. 170) was used.

Commodity	z-value for		Difference between both z	Standard error of the difference
	Total revenue line (dotted)	Total revenue curve (full)		
Chickens	0.25	0.665	0.415	0.408
Peaches	1.83	2.025	0.195	0.471

The standard error of the difference between the z's is in one case as great as the difference, in the other case almost twice as large. The test reveals that the two correlations do not differ significantly from each other, or that the curvature of the full total revenue curves is not significant.

in figure 2 than a regression line. The F-test supplemented by the z-test proved that the curvilinearity is statistically significant for the revenue curves which were derived from the demand curves (full curves) only for chickens, oranges, and peaches and for the calculated revenue curves (broken curves) only for butter, chickens, oranges, and peaches. As to the total revenue curves for butter, chickens, and oranges, the objections under (3) and (4) hold so that there remains only a significant curvilinearity of the total revenue curve for peaches, one commodity out of thirteen.

It seems, therefore, that until now the whole discussion of price discrimination in time was based on rather inadequate empirical findings.

There is a possible argument in favor of the assumption of a convex total revenue curve: the total revenue is very small both with extremely small and with extremely large quantities and is greater with quantities between these extremes which indicates that the total revenue curve must first rise and then fall, that is, must be convex from above. This reasoning proves, however, only that the total revenue curve must be convex somewhere between the extremes, and it does not follow that the total revenue curve is convex in its full length. Nor does it follow that the total revenue curve is convex at the relevant part. It may have the form of a frequency curve and be concave in its whole length except for a short part around the top. This kind of theoretical reasoning does not help very much in this case.

Until now our knowledge of total revenue curves did not permit us to draw any conclusions as to how much price discrimination, or price stabilization over time or at different local markets, would increase the farmers' income, nor even as to whether it would increase the farmers' income at all. It is to be hoped that future research will lead to demand and total revenue curves which will provide a more reliable basis for conclusions relating to economic policy.

RECEIVED SEPTEMBER 22, 1941

INSURANCE ASPECTS OF EXTRA-RISK MORTGAGE LOANS

DONALD C. HORTON
Bureau of Agricultural Economics

IN PART as a consequence of the loan experience of mortgage-credit institutions in recent years, many phases of farm-mortgage lending have been the subjects of intensive investigations both by lending institutions themselves and by independent research workers. Much of such work, however, is admittedly still in the pioneering stages. This article sets forth some thoughts on the subject of sound lending in the extra-risk credit field which it is hoped will contribute to a somewhat clearer statement of the problem. No claim can properly be made, of course, either for originality of the ideas or finality of the conclusions.

Need for study of this type of lending has been increased by the greater participation of public institutions in the extra-risk credit field. One reason for this development has been the feeling on the part of private lenders that they could not afford to take the risks involved in such lending. Without attempting to decide here whether such an attitude is justified, or whether such lending eventually will prove feasible for public institutions operating on a self-supporting basis, it may be safely said that the problem of how best to provide such credit is one for which the final answer has not yet been found.

At least three possible avenues are open for dealing with the extra-risk credit problem:

(1) Capital requirements involving extra risks may be financed largely by means other than credit (equity capital);
(2) Public institutions may extend such credit on a basis requiring that a part of the risk is to be taken by government;
(3) Means may be developed whereby both public and private lenders can extend extra-risk credit on a basis which enables the loan portfolio as a whole to carry its own costs.

It is to the latter approach to the problem that this article is addressed, but with full recognition that it is only one of several possible methods of providing extra-risk credit.

Some Basic Concepts

As concepts and terminology in the farm-mortgage credit field are not highly standardized, it is always necessary to make clear

in what sense certain terms are to be used. The term "sound farm-mortgage lending" is open to more than one interpretation. This term is used here only in its conventional business sense. A sound loan program for an institution is considered here as one which over an extended period of time promises to yield sufficient income to cover all costs, including for a private mortgage institution a net competitive return on invested capital and for a public or quasi-public institution a similar return on any public funds employed. Insofar as this discussion is applicable to the latter type of institution, it is assumed that such an institution is expected to be self-supporting. Whether or not such a basis of operations is desirable for public institutions raises many other public issues not considered in this discussion.

The term "extra-risk credit" also requires definition. The term "risk" is used here to refer only to the chances of loss on an individual loan. There is a place also for a concept of risk as applied to an entire portfolio, but that concept is clearly different from the concept of individual loan risks. Risk as used here refers to the chance that the total amount realized by the lender on a loan, including principal payments, will not be sufficient to cover all expenses properly chargeable to that loan. An extra-risk loan is assumed, therefore, to be one for which the probabilities that a loss will occur are greater, or that the loss that occurs will be larger, than on "normal" or "standard" risk loans.

It should be pointed out, however, that the concept of an extra-risk loan does not apply to the loss on an individual loan that can be foreseen even at the time the loan is made. Risk is associated with uncertainty, and the presence of circumstances which are sure to give rise to loss on a loan are not considered as adding to the risk. Thus a loan made on a basis which affords no possibility of returning enough to cover its own costs is not considered here as an extra-risk loan. This excludes from extra-risk loans those made intentionally as partial grants.

More difficult to define than the general concept of individual loan risk is the more basic concept of loan expenses properly chargeable to an individual loan. Risk is the chance of loss, but the meaning of "individual loan loss" depends on the definition of individual loan costs. Loan returns are a definite amount, but whether, in view of the returns, a loan can be said to give rise to a loss depends on what expenses are considered to be properly chargeable to a loan.

The amount a loan must return in order not to occasion a loss is basic to the concept of individual loan risk, as the risk arises out of the chance that a loan will not return that amount.

All students of cost theory are fully aware of the difficulties involved in imputing an institution's entire costs to particular items of its business. Yet for the purpose of making administrative decisions some concept of individual item costs often is necessary. How, for instance, is the loan officer to decide whether the return probabilities for a loan are sufficiently high in relation to its cost probabilities to warrant making the loan, unless he has some sort of a concept of individual loan costs? A concept of individual loan costs is basic to one of cost probabilities. It is unlikely that any administrative concept of individual loan cost will be entirely satisfactory, either to the cost theorist or to the cost accountant, but this does not remove the necessity for some such working concept as a tool of loan administrations.

The problem of distributing the total expenses of an institution among individual loans relates mainly to how the general expenses of administration and of building up reserves for losses are to be allocated among individual loans. A part of the expenses of an institution is incurred to cover the general administrative costs for the portfolio as a whole and probably has to be allocated on some kind of a pro rata basis. But as certain types of loans can be expected to give rise to higher administrative costs per unit of loan volume than others, there would seem to be a sound basis for some differentiation by broad classes of loans as to the proportion of the general administrative overhead properly allocated to different groups of loans. Likewise, there is probably a good basis for allocating to different groups of loans varying proportions of the costs of building up reserves to meet losses. The validity of this procedure is well recognized in actual mortgage-loan operations, as well as in other noncredit fields.

But there is the additional problem of setting up a workable concept to measure costs for individual loans within any broad grouping of loans. If the necessary contract loan charge for a group of loans with similar risks and administrative costs is made sufficiently high to cover unpredictable losses and other expenses that may occur on individual loans in the group, this means that some of the loans are not expected to make the full contractual payment. If all loans within such a group did pay the full contract amount (both

interest and principal), it is clear that total returns on the loans as a group would be in excess of total costs for the group. The reserve for losses by assumption would not be needed. Hence, a particular loan can hardly be said not to cover its own costs (or to give rise to a loss) merely because it fails to return the full contract amount.

This is another way of saying that the loan charges for any homogeneous risk and cost group of loans normally include an insurance premium designed to collect on those loans that can pay it an amount sufficient to compensate for losses and other expenses on the other loans. Since presumably it is not possible to predict at the outset which individual loans will give rise to the loss or additional expense, all loans in such a group are properly placed under contract to pay the same insurance preimum.

But must each individual loan pay the full contract amount, including the insurance premium, in order to cover its costs and thus not give rise to a loss to the lender? If all did pay this full charge, which includes the insurance premium, the lender would presumably earn more than its total costs, even though no individual loan paid more than its own costs as thus defined.

There would thus seem to be a place for a special concept of individual loan costs that is something less than the contract charges stipulated for each individual loan. Theoretically, a loan might be said to cover its own costs if it yielded an amount sufficient to cover everything except its contractual contribution to the insurance fund. If all loans yielded this amount, the sum of the individual loan costs (defined in this way) would be just equal to the entire costs for the portfolio as a whole.

This concept of individual loan cost is not a new thought. Loan officers are fully aware that it is not always necessary to obtain the full contract amount on each loan in order for the lending institution to be able to earn enough to cover its costs. How much forebearance is justified in particular cases is a matter of judgment, but few would claim that a collection policy which results in a return somewhat less than that specified in the loan contract is necessarily one that places losses on the institution. True, such a collection policy may return less than might be desired by the lender, but it does not necessarily cause a loss for the institution.

The foregoing observations suggest that the risk on an individual loan is not to be measured by the chance that that loan will not yield the full contract amount, but rather the chance that it will

not yield sufficient to cover this amount exclusive of the insurance premium for losses and other expenses. The basic concept that lies back of such a definition of individual loan costs is that of an amount which, if paid by each loan in a homogeneous group, would just enable the institution to cover its entire costs. A loan that returns this amount neither contributes to nor places a drain on the reserve for losses.

The point may be raised, however, that even though some loans yield less than their cost, as defined here, the institution will not lose money so long as enough of the other loans pay more than this amount. But to define individual loan costs at this lower level raises the same problem as when individual loan costs are defined as identical with contract charges. The institution would make excessive profits if all loans returned the full contract amount, whereas the institution would suffer a loss on its entire portfolio if all loans paid less than the amount defined here as the individual loan cost.

It is hardly necessary to add that no claim can properly be made for universal applicability of the concept of individual loan cost suggested here. The term "cost" may be used in a wide variety of senses. The only test of the validity of any cost concept is its usefulness in thinking about and dealing administratively with particular problems. All that is suggested here is that the particular "cost" concept developed may be useful for the particular purpose at hand.

Low Individual Loan Risks and Sound Lending for an Institution Not Synonymous

An individual loan contract written in such a way that a negligible amount of risk is involved for the lender would without question be generally regarded as a sound loan, and a number of avenues are open for making an individual loan standing by itself practically free of risk. One of these is to lend only a small percentage of the value of the security. Despite the presence of extra farm-enterprise risks, a loan can still be made on such an enterprise on a safe basis; and extra-risk loans can be made on low-risk enterprises. For example, a 10-per cent orchard loan on a short-term basis might be practically riskless, whereas a 90-per cent loan on a good Iowa farm made on a 40-year basis might involve considerable risk.

A first step in clarifying thinking about extra-risk credit, therefore, is to recognize that mortgage-credit risks are not to be

identified with farm-enterprise risks. Such confusion is most evident in the common expression "high-risk areas." It is seldom made clear whether that expression is used to indicate that agriculture as an enterprise is risky in those areas or that historically mortgage loans in those areas have involved high risks. The latter situation may be true historically, and still there may be no necessity that mortgage credit in those areas should involve extra risks. Greater clarity of thinking will result if high enterprise risks are regarded as only one of several elements that may be involved in high mortgage-credit risks.

But sound lending for an institution does not require that the risks on each individual loan be held to a minimum. By placing a higher charge on extra-risk loans they can as a group be made to provide reserves for losses incurred on those loans that do not contribute their full cost. In a group of extra-risk loans there will be some that turn out very badly, some that return only their individual loan costs, and still others than can pay much more than their own individual loan costs. By placing a higher interest charge on extra-risk loans, those that can pay more than their individual loan costs provide the reserve for losses. The higher rate results in more defaults, but so long as the lender collects all that the defaulting borrowers can pay, the net effect is to provide in the aggregate additional reserves for losses.

Presumably at the time the loans were made the total loan costs could be predicted, but there was no basis on which to distinguish between the different loans as to which would give rise to losses. If such had been the case for individual loans, the lender would normally have attempted to treat them differently in the first instance. If extra-risk loans are chosen in such a way that adequate diversification of risks is provided, there is no reason why credit cannot be extended on such loans on just as safe a basis, from the lender's viewpoint at least, as on standard-risk loans.

Adequate diversification, however, does not mean that there should be a sufficient number of low-risk loans in the portfolio (paying the same interest rate as the extra-risk loans) to cover the excessive costs and losses that can be predicted for the extra-risk loans as a group. This meaning is sometimes given to the term "diversification." It is possible to have adequate diversification even in a group of loans in the same risk and cost stratum.

To obtain such diversification for the life span of the group of

extra-risk loans probably would require both geographical and type-of-farming diversification; and, of course, some diversification is obtained through the length of the period of the loans. For example, moderate loans on high-risk enterprises, regardless of the geographical location of the enterprises or of the type of farming, could be combined with larger loans on less risky enterprises in still other areas and on still other types of farming. Within any homogeneous risk grouping it should be possible to obtain diversification not unlike that obtained in other fields to which the insurance principle has been found applicable.

It is not intended to argue here, however, that by providing for a high interest rate on an individual extra-risk loan it would be feasible to build up a sufficient reserve for that loan to carry all of its own potential losses and other unpredictable costs. Fire insurance rates are not expected to accomplish this in the case of individual properties. Since raising the contract loan charges will not in itself produce additional income from which the individual borrower can build up a reserve for his own loan, it is entirely possible that the only added protection to the lender from a higher interest rate is his ability to collect more nearly all that the particular borrower can pay during the full life of the loan. It surely does not enable the borrower to pay more.

It should be noted, also, that ability to transmute extra risks for individual loans into credit charges for all loans in a group, through the application of the insurance principle in setting loan charges, assumes that some borrowers in the group will make unpredictable profits as well as that others will suffer unpredictable losses. This means that if the group as a whole is granted credit in excess of their ability to carry the debt out of the contract loan charges, then the loans as a group may be in somewhat the same position as regards risks to the lender as any individual loan. In a period of widespread depression in agriculture, all loans in a risk group may be affected. If too much has been loaned, or if the interest rates were set too low, it may be impossible to collect enough even from the relatively more fortunate ones in the group to offset all of the losses for the others.

In other words, loan insurance available to the lender by charging higher rates on extra-risk loans is not a complete substitute for restriction of the aggregate amount loaned to the group to a level of debt which can be supported from income available for debt

service. But even here, insofar as an attempt is made to use the insurance principle in lending, the lending institution may be able to collect more nearly the maximum amount that the group can pay and thus reduce losses on the entire group of loans.

Sound Extra-Risk Lending Involves Special Lending and Collection Procedures

Although the events of the last decade have given an added impetus to the study of many problems of farm-mortgage lending, there does not appear to have been any great emphasis on the problems of sound lending in the face of extra-credit risks. One reason for this neglect, no doubt, is the not uncommon attitude that it is an undesirable long-run policy for self-supporting institutions to extend credit involving high individual loan risks. Few would deny that there is a point in the scale of risks beyond which financing should not be attempted entirely on the basis of credit. At some point in this scale it is better to require that an owner's own capital be risked rather than attempt to adjust credit arrangements so that they will provide for the carrying of the risks by a lender. Back of this generally accepted view is also the belief that the use of credit to finance such capital requirements for high-risk enterprises carries with it potentially undesirable secondary influences which can be avoided only if those with substantial capital of their own assume the risks of the most hazardous enterprises.

Lending on extra risks necessarily involves more numerous or heavier potential losses to the lender on individual loans than does lending on standard risks. To provide adequate reserves for such losses necessitates that the contract loan charges be set well above the most probable loan costs for individual loans, thus providing for relatively heavy fixed charges for extra-risk borrowers as compared with low-risk borrowers with the same probable income available for debt service. Extra-risk lending on a sound basis tends to beget more, or more serious, loan defaults than does low-risk lending; and either foreclosures must be more numerous or systematic methods of debt adjustment must be worked out. It is probably because extra-risk lending on a sound basis for the lender tends to beget extensive defaults and foreclosures that many would counsel against such lending even though such a loan business could be conducted on a sound financial basis from the lender's viewpoint.

But to say that sound lending on very high credit risks may have

undesirable consequences for all concerned does not mean that lending only when there is almost complete absence of risk on individual loans is necessarily the most desirable procedure. Standard-risk loans involve some risks on individual loans. There is apparently no logical basis for insistence that only loans meeting a certain risk standard should be made. There would appear to be a fairly wide range of credit risks in the mortgage-credit field as elsewhere that may properly be financed through credit. The amount of risk that should be carried through credit arrangements depends largely on ability to devise the appropriate credit policies to carry these risks efficiently and with minimum danger of creating undesirable secondary effects on lending institutions and agriculture.

The application of insurance principles to lending is in a sense a special form of income insurance. The lender by charging a higher interest rate on extra-risk credit builds up a reserve, paid in by those who find themselves able to pay the higher charge, to compensate for the lack of funds available for debt service for other borrowers. This form of income insurance protects the lender, but without necessarily giving the defaulting borrower the full benefit of the insurance scheme.

If the reserves of a loan institution are regarded as a fund to compensate for unpredictable deficiencies in the ability of the borrower to pay the full costs of his loan, then a good case might be made for regarding the borrower as not actually in default at least so long as he had not used up that part of the reserve he has already built up in excess of his own most probable individual loan costs. The lender does not suffer a loss on such a loan if the borrower has already built up a fund from previous contributions to the reserve fund that will compensate the lender for his temporary inability to pay. Temporary inability to continue to contribute to the reserve fund alone can hardly be considered as creating a loss for the lender.

It would appear, therefore, that there may be a sound business basis for a somewhat different collection policy for an extra-risk than for a standard-risk lender. The basis for this difference is the larger part of the total loan charges on extra-risk loans represented by the contribution of borrowers to the lender's reserve for losses. Since the lender does not need to collect the full contract charges on every loan to earn a net competitive return on his funds, there would seem to be an appropriate place for a substantial amount of

debt adjustment or debt compromise as a substitute for foreclosure. How far in actual operations it is possible to work out the techniques for such adjustments presents practical administrative problems; and administrative difficulties no doubt would become the immediate limiting factor for such adjustments.

One of these administrative problems would be how to treat a defaulted loan where the loan had not been outstanding for a sufficient time to have contributed much to the institution's reserve. Adjustment would seem feasible so long as the amount already paid into the insurance fund would still cover the most probable costs for the particular loan. But if a further adjustment were to be considered, there would be the problem of evaluating the probabilities that in the future such a loan has as good prospect of contributing its full costs and its share to the reserve fund as other loans. If the loan default were occasioned by circumstances beyond the control of the borrower that might befall a loan any time during its life, and if the future prospects are as good for this as for any other loan, then it might be feasible to permit a defaulted loan in effect to draw in advance on its prospective future insurance contribution.

In substance this is what some lenders do when they pursue a lenient collection policy even to the point of taking a chance on the loan working out. Provided that the contract loan charges for all loans in the group are set high enough to provide a sound basis for the insurance fund, such a collection policy might not be philanthropy but only sound collection procedure. The forecast of the future of a loan in difficulties might not be any more hazardous than that made at the time the loan was originally made.

Extra risk lending on the basis suggested above does not necessarily contemplate, however, that the lender should share fully in the business losses of his creditors. The concept of sharing losses is sometimes phrased in terms of the lender entering into a "partnership" with the borrower. Even though in actual operation the results of the two methods of lending might be similar in some respects, there would seem to be a need for an entirely different financial relationship if outright creditors' sharing of losses were contemplated. The lender perhaps would demand that he share fully in the profits of those who earn them if he were expected to share in all of the losses of those who suffer losses.

All that is suggested here is that lenders of extra-risk credit so

arrange their contract loan charges that they will have an insurance fund that will compensate for temporary inability of borrowers to pay an amount equal to their individual loan costs. The fund cannot be used safely to absorb losses that are over and above those for which provision has been made in the schedule of loan charges. Moreover, for any one extra-risk lender the amount of reserves that can be built up to absorb losses, and thus the extent to which the lender can share in borrower losses, will depend in part on the competitive situations in the loan market as a whole. How far an individual lender can go in making provision for the absorption of borrower losses will depend in part on whether the borrower prefers to contract for a higher rate, and thereby obtain greater protection against foreclosure, or whether he prefers to obtain credit at a lower contract rate and carry his own risk of being foreclosed in a period of temporary adversity.

The substance of the thoughts presented here is that greater recognition should perhaps be given to the element of insurance charges included in the interest rate and other charges made in connection with extra-risk loan operations. If it is frankly recognized that in all loan operations, and particularly those in extra-risk lending, a no-small part of the charges is in the nature of an insurance charge, then there is the further question of how best to administer the resulting insurance fund. If means can be worked out whereby this fund can serve to cushion some of the shocks to agriculture and at the same time not place undue financial burdens on lenders, a long step will have been taken toward the financing of extra-risk credit on a basis that will not eventually give rise to public problems.

An important requirement to be observed, however, is that the contract loan charges for extra-risk loans must be made consistent with the cost of insuring against the loan hazards. Such a cost, regardless of how carried, is as much a part of the cost of production as are seed, fertilizer, and farm labor; and presumably the consumer of products the production of which involves extra financial risks cannot reasonably object to paying the full cost of such products. By administering the insurance fund collected in connection with mortgage lending as a contribution of borrowers to insure both themselves and the lender against losses associated with mortgage credit, it may be possible to prevent some of the undesirable secondary effects of extra-risk lending. How far this

limited form of income insurance can be associated with mortgage-credit operations is a question reaching still farther into the broader field of insurance against the financial hazards of agriculture.

Need for Further Study of Principles of Sound Lending on Extra-Credit Risks

These observations have not been set forth as a complete blueprint for an extra-risk loan program. They are intended to be exploratory and suggestive rather than exhaustive and conclusive. It is hoped that they will serve to indicate that there is a need for the further study of principles of extra-risk lending on farm-mortgage security, using the same tests of financial soundness as are usually applied to the study of principles of sound lending in the standard-risk strata.

By providing in advance for a part of the financial hazards of farm ownership, a soundly conceived and operated extra-risk credit program might go far to further the ideal of farm ownership by the operator. It is the belief of the author that there is a sound basis for extra-risk lending directed to this end and divorced completely from the customary concepts of subsidized lending. Such a basis for granting farm-mortgage credit cannot, of course, be expected to take the place of relief and other subsidized lending, but may be able to provide systematically for certain types of extra-risk credit on a basis which will make less necessary the eventual resort to such lending. In fact, it seems probable that full recognition of what is involved in sound extra-risk lending may have some direct application to subsidized lending on extra-credit risks where it is considered socially desirable that the reserve for losses be provided from public funds rather than from borrowers' own contributions.

RECEIVED AUGUST 8, 1941

DEVELOPMENT OF "NORMAL" CITRUS FRUIT YIELDS BY TREE AGES FOR USE IN A YIELD INSURANCE PLAN

RALPH R. BOTTS
Bureau of Agricultural Economics

CITRUS FRUITS are the first tree crop on which crop insurance research has been done with a view to determining an actuarial basis for the insurance of yields. It was recognized in the research on annual crops that insurance under individual contracts must take into consideration the full variation in farm yields. Averages "iron out" these variations and do not reflect fully the risks involved. For this reason, the yields for individual farms over a long period of time were studied to arrive at an insurable production and a premium rate necessary to cover the losses that would have had to be paid under the contract during the "history" years.

As fruit trees increase in age, there is an increase in production because of increased bearing surface in the earlier years.[1] A simple average of past yields, particularly where the "history period" extends back to the earlier tree ages, would not give a true indication of what future yields might be expected to be. Some recognition must be given to trends in yields that are associated with increased age of the trees.

This article has as its purpose a description of how this problem has been approached with respect to citrus fruits. In the discussion which follows, reference is made only to the grove records obtained in Florida. Similar data were obtained in California and Texas and have been studied in like manner. The discussion is limited to the Florida records merely in the interest of brevity.

In the course of the crop insurance research on citrus fruits, 1,188 Florida grove records have been obtained from various sources.[2] It was felt that there were enough records in each age

[1] After the trees reach maturity there is a leveling off in yields. For example, yields for Florida grapefruit trees seemed to start to decline at about 35 years of age. There were not enough records at the older ages to establish more than what appeared to be a quite definite leveling off in yields for Florida oranges and tangerines.

[2] Production data for 6 years or more were available for about one-half of the groves, while records for varying periods of less than 6 years were available for the remainder. Information from the records was punched to Hollerith cards. By sorting these cards on "age of trees" weighted and simple average yields per 100 trees were obtained by ages of trees, for oranges, grapefruit, and tangerines. Specific varieties of a particular kind of fruit were not treated separately. For example, no attempt

group, sufficiently well distributed among the high- and low-yield years, to "iron out" the effect of the season in which the production occurred and result in an average or "normal" yield expectation for each age.[3]

Some idea of the size of the sample at different age levels can be obtained from table 1.

TABLE 1. FLORIDA CITRUS FRUITS: SIZE OF SAMPLE UPON WHICH "NORMAL" YIELDS ARE BASED (SPECIFIC AGES HAVE BEEN SELECTED)

Age of trees	Oranges		Grapefruit		Tangerines	
	Groves	Trees	Groves	Trees	Groves	Trees
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
5	77	39,407	26	10,009	4	235
10	377	293,726	163	112,129	90	29,001
15	744	567,899	400	244,564	212	74,133
20	405	188,659	302	136,623	84	15,945
25	152	965,559	143	51,107	41	10,180
30	121	68,599	85	21,423	25	1,680
35	62	33,750	29	4,337	6	113

For example, the "mormal" yield of 25 standard boxes per 100 trees for 5-year-old orange trees (see table of selected "normal" yields) is based on 39,407 trees in 77 groves. In other words, 77 of the 1,188 records covered orange trees that were 5 years old in one or another of their "history" years; 26 of these same or other of the records covered yields on 5-year-old grapefruit trees. The composition of the sample at these ages is shown merely to give some idea of the volume of data upon which the "normal" curves are based.

The simple average yield for practically every age was greater than the corresponding weighted average, indicating that the highest yields were in general on the smaller acreages. In simple averaging, a grove with 10 or 15 trees, for example, receives the same consideration in the calculation of the average yield as a grove with 1,000 trees. It was felt, therefore, that the weighted average provided a more representative yield for all trees at a given age.

---

was made to find an age-yield relationship for Valencia oranges separately from pineapple oranges. Varieties of grapefruit and varieties of tangerines were handled in like manner. Moreover, it was felt that varietal differences in yields within a kind-of-fruit classification were not sufficient to warrant "breaking down" the sample at each age into (the smaller) varietal groups.

[3] For example, some groves were 15 years old in a year of generally low yields, as the 1934–35 season, while others attained the same age in a high-yield year, such as the 1936–37 season. It is quite likely that experience representative of all crop years is sufficient to eliminate the effect of variations between seasons.

The weighted average yield per 100 trees was calculated for each age and a smoothed "freehand" curve was drawn through these points. The smoothed curve is what is referred to as the "normal" yield curve. These curves for the different kinds of fruit should give a pretty good indication of the average relationship between age and yield.

The weighted average yields for Florida grapefruit by tree ages are shown on the succeeding chart. A smoothed line of average

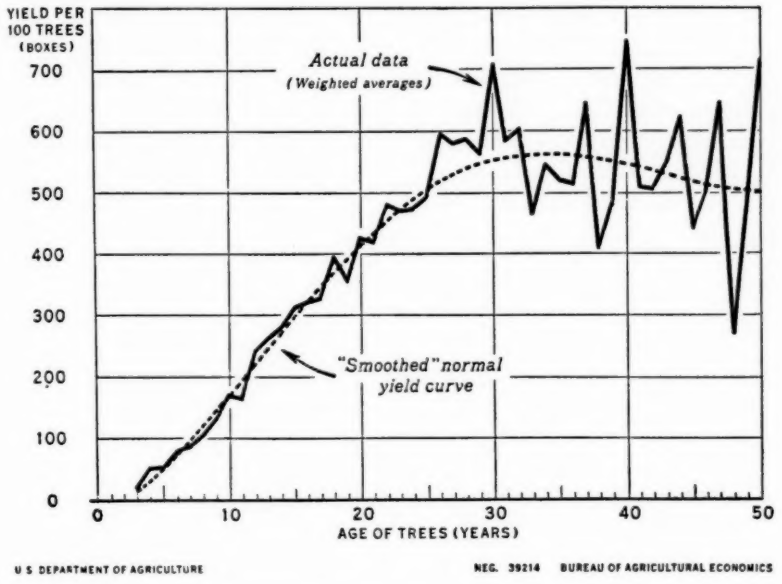


FIG. 1. FLORIDA GRAPEFRUIT: YIELDS PER 100 TREES BY TREE AGES; ACTUAL WEIGHTED AVERAGES COMPARED WITH "SMOOTHED" DATA.

relationship has been drawn through the points. On the basis of the sample, it appears that yields for Florida grapefruit increase on the average until the trees reach about 34 years of age; then they start to decline. The normal yield for 15-year-old trees is based upon the largest sample of groves. The size of the sample increased up to age "15," and declined thereafter. After the "25" was reached, the weighted average yields—as illustrated for Florida grapefruit—became increasingly erratic.[4] More smoothing of the weighted averages was therefore necessary at the older ages, beyond 25

[4] The sample of trees at age 25 was only about one-fifth as large as the sample at age 15.

years, than was necessary at the younger ages. The smoothed "normal" yield curve for Florida grapefruit was leveled off at the age "50" because of a lack of data for trees at older ages.

Possible Application of Age-Yield Relationship to Insurance

At the present time the Federal Crop Insurance Corporation is insuring wheat farmers for 50 or 75 per cent of their average yields. The averaging of past yields to determine an insurable production, as used in the wheat program, is based on the assumption that past yields provide a reliable indication of future yields. This is not necessarily true in the case of citrus fruits, where there is an increase (or decrease) in yields associated with increased age of trees. An insurable production based on a simple average of past yields, especially with respect to trees at the younger ages, might be so low in comparison with future yields that growers might not be adequately protected if insured on that basis. Some consideration should be given to the trends in yields.

Table 2. Florida Citrus Fruits: "Normal" or Average Yields per 100 Trees, in Standard Boxes
(Yields for selected ages only are shown)*

Age of trees	Yield per 100 trees		
	Oranges	Grapefruit	Tangerines
	Boxes	*Boxes*	*Boxes*
5	25	50	55
10	114	171	141
15	203	298	208
20	261	413	259
25	306	505	290
30	342	553	311
35	368	562	321
40	383	545	325
45	395	519	325
50	400	501	325

* A complete table showing yields for the intervening years has been prepared and will be furnished to those sufficiently interested in this project.

If the yields for an individual grove were superimposed upon the basic pattern of yields (the "normal" yield curve) to determine its yields in relation to the average expectation for trees of the same ages, then the lower yields in the earlier producing years could still be used in arriving at an appropriate insured production for the grove. Then if the hypothetical coverages were compared with

the actual production for the grove during its "history" years, a measure of the risk involved would be available. An illustration is given in table 3, based on actual records for an orange grove.

TABLE 3. ILLUSTRATION OF A SUGGESTED PLAN FOR DETERMINING COVERAGE AND LOSS COST (CALCULATIONS ARE PER 100 TREES)

Season	Age of trees	Actual yield	"Normal" yields based on large sample	"Expected" yields for this grove*	75 per cent coverage**	Annual losses
1	2	3	4	5	6	7
	Years	*Boxes*	*Boxes*	*Boxes*	*Boxes*	*Boxes*
1932–33	10	89	114	160	120	31
1933–34	11	384	134	188	141	0
1934–35	12	139	153	214	161	22
1935–36	13	206	171	239	179	0
1936–37	14	360	188	263	197	0
1937–38	15	174	203	284	213	39
Total....	—	1,352	963	—	1,011	92

* Column 4 multiplied by "yield rating." (The yield rating would be 1352÷963 or 1.40.)

** 75 per cent of "expected" yield for each age (col. 5).

This grove produced a total of 1,352 boxes per 100 trees during the 6 years. The trees were 10, 11, . . . 15 years of age. The "normal" yields for these same ages total 963 boxes. The "yield rating" (this grove's production in terms of normal) would be 1352/963 or 1.40. The normal yield for 10-year-old trees (114 boxes) is multiplied by the yield rating (1.40) to determine an "expected" yield (160 boxes) for this grove in the 1932–33 season, when these trees were 10 years old. Seventy-five per cent of this "expected" yield would provide a hypothetical 75-per cent coverage (of 120 boxes) for the 1932–33 season. Since the actual production of 89 boxes was below the coverage, it could be assumed that an indemnity based on this loss would have been paid.

Deficiences in yields below 75 per cent of "expected" yields totaled 92 boxes for the 6 years. However, a premium rate based on one-sixth of 92 boxes (or 15.3) might not be adequate as a premium charge, since the coverage in the following year (assumed to be the year of insurance, when the trees would be 16 years old) would be $0.75 \times 1.40 \times 216$, or 227 boxes per 100 trees—the 216 boxes being the "normal" expectation for 16-year-old trees.

An insured production of 227 boxes would be higher than during any of the history years, because of the increased age of the trees. Since the coverage in the year of insurance would be greater than 75 per cent of the average yield for past years, the premium rate also probably should be higher than the average loss for previous years. Perhaps the premium rate should go up somewhat in line with increases in coverage. For instance, instead of considering the simple average of 15.3 boxes as a basis for an appropriate rate, $92/1011 \times 227$ or 20.6 boxes probably should be used as a measure of the risk involved in insuring for the increased coverage.

While a study of the records obtained from six Florida citrus associations for 6 years or more would not seem to indicate that increased losses are associated with increased coverages, it is the opinion of the writer that some loading of the premium rates is necessary as a cushion against unexpected losses not reflected in the historical data. This may be advisable inasmuch as it is necessary to depend on the records for a few years to reflect the hazards over a longer period. In specific "freeze" years, such as the 1934–35 season, there was a very definite increase in losses associated with higher coverages. In view of this fact, it is felt that increasing the premium rate somewhat in proportion to the increase in coverage might provide an equitable means of accomplishing this loading of the rates.

Received July 28, 1941

NOTES

DISTRIBUTION OF FARM BENEFIT PAYMENTS

A RECENT article in this Journal by T. L. Smith and R. W. Roberts[1] is illustrative of the increasing attention being paid to the tendency of benefit payments under action programs to go to commercial producers of certain crops rather than to improve the status of the farmers with very low incomes. The intent of this note is neither to condemn nor commend such questioning of these programs. Its object is to direct attention to some of the conditions which have had a part in adopting methods of payment distribution which produce these results. Proposals to effect changes in these methods must reckon with these factors.

The inclusion of the word "adjustment" in the act of 1933 and in the title assigned to its administrative agency was neither accidental nor incidental. The objective of the act, like that of its predecessor the agricultural marketing act, was that of raising prices of farm products. The efforts of the Federal Farm Board were held to have failed because it was not provided with any means of holding production in check. The agricultural adjustment act was designed to achieve the end of price improvement by means of adjustment (i.e. curtailment) of acreage of certain "basic" farm products. "Parity prices" were set as the goal for the program. Payments to farmers from a fund provided by the collection of processing taxes were provided to induce them to agree to adjust acreages. In effect, the payments were designed to buy adjustment in order to bring about a supply situation which would improve prices. The program was designed to raise farm income by bettering price in the market place rather than through the distribution of public funds in the form of payments. The latter process constituted the means and not the end. Regardless of the emphasis which certain administration leaders gave to the idea of aiding "the lower one-third," the programs which raised prices benefited mainly the producers for whom the market is the important source of income. If payments were to serve the intended purpose they naturally had to be made to farmers who were important producers rather than to the low-income class.

---

[1] Sources and distribution of farm population in relation to farm benefit payments. JOUR. FARM ECON., 1941, 23(3): 607–618.

When the Supreme Court decision in 1936 invalidated the adjustment features of the original act, soil conservation was rushed into the breach as a justification for making payments to farmers. The program came to be viewed as one with a dual purpose—soil conservation and acre adjustment. The payments made under the revised legislation were ostensibly intended to buy certain returns (conservation and adjustment) rather than to serve primarily the purpose of adding to the income of the recipients. It may well be contended that the payments have not been very effective in procuring price enhancement through supply reduction and that there is doubt about whether the public has gotten full returns in terms of conservation. However, that is not the point of this discussion. We are concerned here with the professed objectives rather than with the ultimate results because the former rather than the latter determined the bases for the distribution of payments.

Loan programs have served to "put a floor" under prices and to provide additional income for the farmer storing commodities. The benefits again clearly go to the "haves" rather than the "have nots." Parity payments being based on production have the same result.

The provisions in the act of 1938 for adding to the payments below certain minima and restricting the total payment in some cases may be pointed to as a shift in emphasis. At best, it is very limited. More recent legislation fixing higher loan values on stored commodities indicates that major emphasis is still on prices in the market place.

Everyone who has paid serious attention to the economic problems of agriculture must be aware of the fact that a minor proportion of the farmers produce by far the larger share of the supplies on the market. This may raise the spectre of "corporation farming" in the minds of persons not intimately acquainted with agriculture. To quiet such fears it may be added that most of this output originates with individually operated farms. In spite of the fact that the census count of farmers includes a large number who are not important as producers for market, we continue the glib use of figures to represent average farm incomes without thought to the wide range which these averages encompass. We likewise tend to assume that anything which improves prices in farm markets will distribute benefits rather uniformly among the farm population. This, of course, is not the case.

The preceding suggests why the results of present farm programs are distributed as they are. Some fundamental changes in the basic objectives of public policy will need to take place if we are to effect any radical revision in the way in which government payments to agriculture are allocated. If it is the aim of public policy to distribute funds from the Treasury in order to raise the income of farmers by such grants rather than through operations in the market place, then it seems clear that the major basis on which the allocation is made should be the relative needs of the respective individuals involved. Present programs are not on this basis.

The purpose here is to point out that such a change would involve a drastic shift in our attitude towards governmental programs. There are a number of important points which will need careful appraisal in any such change. Without entering upon a discussion of them, one or two may be suggested as illustrations. For one thing, we would want to ponder rather carefully the possibility that a program of adding to the means of low-income farmers by direct grants of public funds might make of them permanent "pensioneers." One, perhaps, should hasten to add that our present system of payments may be leading to a similar result. Another question revolves about the problem of avoiding creating a system which will inhibit a desirable flow of surplus farm population into other fields of activity. Still another point which would arise in connection with such a shift is that the program being concerned with need rather than with problems of price no longer would apply logically only to farm people. Those with low incomes throughout the entire population would merit equal consideration.

The adoption of any basic change of the sort suggested would encounter real difficulties in the form of opposition from those who have acquired a vested interest in present programs. The belief in parity price as a right to which farmers are entitled has been encouraged to the point where it will not be readily abandoned. Payments on the basis of individual need call for the adoption of a concept of general welfare rather foreign to popular thinking about present programs. This is not a disparagement of the idea but merely a recognition of facts as they are.

There is a psychological reaction which is likely to impede a change of this sort. Most people prefer to "earn" their income rather than to receive grants from public funds.[2] Income which

[2] Some attention is given to this by T. W. Schultz in his article: Economic effects of agricultural programs, in the American Economic Review, February, 1941.

comes through market price, even though that may be arbitrarily maintained by some program, is regarded as earned. The word "earn" is frequently used in connection with present adjustment payments, encouraging the belief that the receiver is giving service in the way of acre adjustment or conservation in return for his payments. This belief strengthens the view that farmers have a "right" to continue to "earn" such income. Grants on the basis of need, on the other hand, are looked upon as "relief" and carry with them an idea of opprobrium.

Without entering upon a detailed discussion of the article by Smith and Roberts referred to above, a brief comment on one or two of their suggestions may not be out of place. They recommend that federal benefit payments be allocated among the states in proportion to farm population. Does not this tend to overlook the fact that need is far from being distributed among the states or in various areas of a given state in proportion to farm population? They suggest further that the federal contributions be made for the support of essential public services rather than as payments to individuals. This merits careful consideration. It will avoid inviting individuals to become dependent upon public grants for their support. However, there are grounds for skepticism with respect to the opinion that this will get us away from "gimme" attitudes. Witness the efforts of states and cities to get enlarged grants from the federal government in support of relief. Note the pressures from areas where tracts of federally-owned land are located to obtain federal grants in lieu of taxes. Note also the public's eagerness for ornate post-office and other federal buildings.

The authors point out that grants of federal funds for public services can be used to reduce the burden of farm taxes. However, it will be well to bear in mind that the benefits of such relief may go in large measure to commercial farmers rather than to those most in need. Rather than to make lump payments to states, the federal government probably would find it necessary to specify the uses of such grants in order that they might be most effective in alleviating the problems in distress areas. Such specification may be expected to raise a hue and cry over federal domination of state and local activities. The longer-run effect of any reduction in local tax burdens may be to increase land values and, to the extent this occurs, the attainment of the desired ends will be modified. (This, by the way, is an effect from which present programs are not entirely free.)

The present interest in and attention to the "farm problem" too frequently make the mistake of assuming that farmers are all pretty much alike in economic status. There is need for greater appreciation of the wide ranges included in the farm population and for better adaptation of agricultural programs to actual conditions. This is a matter to which agricultural economists, farmers, program administrators and legislators ought to give more attention.

O. B. JESNESS

University of Minnesota
RECEIVED AUGUST 25, 1941

COMMON ERRORS IN EVALUATING FARM PRACTICES

THE EFFECT of changes in farm organization and operation should be measured not by the return from one crop or one enterprise, but from the standpoint of the whole farm. The economic measure of these effects should be expressed in terms of relative returns to the farm operator, not exclusively in terms of profit per acre, return per man hour, or feed units per pound of gain. The latter measures are very useful in analyzing parts of the farm organization, but they do not constitute a measure of the total effects of changes in the organization and operation of a farm, and should not be substituted for such a measure.

The organization and operation of a farm involve an intricate bundle of inter-acting factors and influences. The combination of crop and livestock production enterprises are affected by varying kinds and proportions of labor, power, equipment and materials, as well as by varying kinds of land. The effects of dominant physical factors of crop adaptation are influenced by methods of crop production and by the utilization or disposal of the crops produced. All of these influences have supplementing, modifying or conflicting relationships. Some factors may have opposite relationships at different seasons of the year.

Due to the complexity of farm operations affected by these varying combinations of physical and economic forces, many detailed studies have dealt with parts of this bundle of influences. Specialized studies of segments of the farm organization have made available much necessary information concerning the relationships of different parts of the farm business. However, they have

not always been kept in the perspective of the farm as a unit. Without depreciating the value of more information concerning component parts of the farm business, the principal purpose of this article is to plead for consistently following through to effects on farmers' incomes in order to avoid erroneous conclusions based on comparisons at some intermediate point.

Much time has been spent in persuading the farmer that it would be advantageous for him to change the organization and operation of his farm. This field of activity abounds with delusive paths of reasoning which have not culminated in sound income comparisons. Attention is directed to some of the reasons for the abundance of faulty conclusions due to erroneous methods of economic interpretation.

What Price Labor?

Many faulty conclusions are made because of the assumption that all of the labor spent in agricultural production is of the same value per unit. As a matter of fact, most of the labor used in agricultural pursuits is that of the operator and his family. At peak periods this labor might be charged at hired labor rates because some labor is already being hired or because it would be necessary to hire additional labor if the labor of the operator and his family were not available. At other periods of the year, however, the problem is one of marketing this labor to best advantage, because little opportunity for the alternative use of this labor at hired labor rates is ordinarily available. If these alternatives at various seasons of the year were reflected in the imputed labor rate, the farmer's labor might be worth 30 cents per hour in April, 60 cents in July, and 10 cents per hour in December. A few illustrations may help to emphasize how the method of calculating labor costs often influences the conclusion reached. For instance, assume the following situation in respect to a specific crop:

Gross value of product per acre		$40
Hired labor per acre	$ 3	
Other expense items	10	
Labor of farmer and family	20	
Total Expense		33
Net return per acre		7
Contribution to farmer's income		27

If the effect on the farmer's income were being considered, the above figures should be interpreted to mean that the crop contributed $27 per acre rather than $7.

Although this seems rather obvious when the items are clearly labeled, let us see what happens when two crops are compared on the same basis.

	Crop No. 1		*Crop No. 2*	
Gross value per acre		$40		$25
Hired labor	$ 3		$0	
Other expense items	10		5	
Labor of farmer and family	20		5	
Total expenses		33		10
Net return per acre		$ 7		$15
Contribution to farmer's income		27		20

The net return per acre comparison would be a valid one only if the acreage could be expanded four times so that the farmer's labor could be utilized as completely as in the first case. On a fixed acreage, the second crop actually reduces farmer's income by one-fourth rather than doubling it as would be implied by the net return comparison.

Cost Rates for Additional Use Vary from Average Rates

This same principle of considering the incidence of cash costs and their effect on income applies also to the use of power and equipment. An additional 100 hours of horse or tractor use probably will not cost the same as the first 100 hours. The first 700

Item	Method No. I	Method No. II	Method No. III
Kind of terracer	Slip scrape	Plow and drag	12 foot grader
Power unit	2 horses	15 H.P. tractor	60 H.P. tractor
Number of men	1	1	2
Hours per mile	250	80	12
	Dollars	*Dollars*	*Dollars*
Hired rates per hour:			
Man labor	.20	.20	.60
Horse work	.12	—	—
Tractor use	—	.65	1.75
Terracing equipment	.03	.10	.75
Rates for additional use of farm labor, power and equipment:			
Man labor	—	—	*
Horse work	.02	—	*
Tractor use	—	.30	*
Terracing equipment	.03	.05	*
Cost per mile:			
Hired rates	117.00	76.00	44.00
Use of farm labor and power	18.00	28.00	*

* Not ordinarily a part of regular farm equipment.

hours of horse work per horse might cost 12 cents per hour in terms of cash costs and alternative values of feed and labor, and only 5 cents per hour for an additional 100 hours above 700. On the other hand, a need for additional horse work that necessitates an increase in the number of horses kept and results in a decrease in the number of hours worked per horse might justify a charge of 20 cents per hour of additional horse work.

A further illustration of the importance of correctly interpreting the influence of a new or changed practice on the farmer's costs might be made by a consideration of alternative methods of constructing terraces. The comparison tabulated of three methods of terrace construction, two of which involve the additional use of the farmer's labor, power, and equipment, suggests opposite conclusions depending on whether the work is to be hired or performed by the farmer in slack periods. It was assumed in this case that the farmer did not have alternative use for the labor involved and that the additional horse feed and harness wear would amount to 2 cents per hour instead of 12 cents. The additional tractor costs include fuel and oil at average rates per hour, but with a much lower than ordinary rate for depreciation and no additional charge for shelter and interest on investment. With these assumptions the mile of terrace might cost almost three times as much with horses and slip scrape as with a 12-foot grader and tractor, if all were hired, but less than one-half as much as the hired grader if the farmer made additional use of his regular labor and power during slack periods.

Comparing Interdependent Enterprises

In many cases the returns from specific enterprises are compared to a degree beyond that of rational comparability. The interdependence of the yield per acre of one crop upon the yield of another crop often renders meaningless the relative per acre returns between the two crops. A relatively greater return from corn than from some legume crop in rotation would be of little significance if the actual corn yield were dependent on the growing of a legume sod crop preceding it. Likewise, the return from small grain often must be interpreted in the light of the necessity of a nurse crop for legumes and grasses. The crop combination or cropping system is usually the least common denominator of influence of crops on farm income. Even if specific crops were not agronomically interdependent,

seasonal labor peaks and slack periods, feed utilization by livestock, and the efficient use of power and machinery would dictate a consideration of the combination of crops rather than undue emphasis on relative returns from each crop.

Digestible Nutrients Not a Common Denominator for All Purposes

Another assumption, which is implicit in many erroneous conclusions, is that all feed nutrients have the same value per pound irrespective of the form or proportion in which they occur. And yet average farm prices for feeds vary from $2.00 per 100 pounds of digestible nutrients in high-protein concentrates to $1.25 per hundred pounds of digestible nutrients in the form of grain, $1.00 in the form of hay, $0.50 in the form of straw, and $0.33 in the form of pasture. The reasons for these wide variations are principally differences in composition and in the concentration and location for utilization.

Feeds with high proportions of protein are very valuable as a small part of a ration that is otherwise deficient in protein. Grains are relatively more valuable than hay or pasture because of the greater possibility of storage and transportation and because of their better adaptability to the production of fattening types of livestock. Hay can be stored for use in the non-grazing season, while pasture must be utilized in place during the season it is available. While the farm price of nutrients in various feeds is not perfectly related to their contribution to farmer's income, because of the small proportion of some of the feeds, that are marketed as such, it does give some indication of important differences in the value of nutrients from various sources.

Measuring Effects of Pasture Practices

An unpublished report of the economics of pasture treatment values the nutrients in pasture in terms of corn equivalent at 60 cents per bushel. On this basis the digestible feed nutrients harvested from the untreated pasture were worth $12.00 per acre, and from a pasture treated with limestone and superphosphate at a cost of $1.75 per acre per year, the annual yield of pasturage would be worth $19.20 per acre. This represents a net return of 320 per cent of the cost of treatment. The analysis of the effect of pasture treatment on farm income is hardly as simple as that. The contribution to farm income by nutrients in various kinds of pasturage at various

times of the year might vary from zero to considerably more than the average annual value of nutrients.

About fifty per cent of the normal growth of permanent pasturage in many parts of the country occurs before the end of June. The latter part of the pasture season usually involves the use of supplementary pastures, supplementary harvested feeds, sale of livestock, or reduced livestock production per head, with perhaps actual

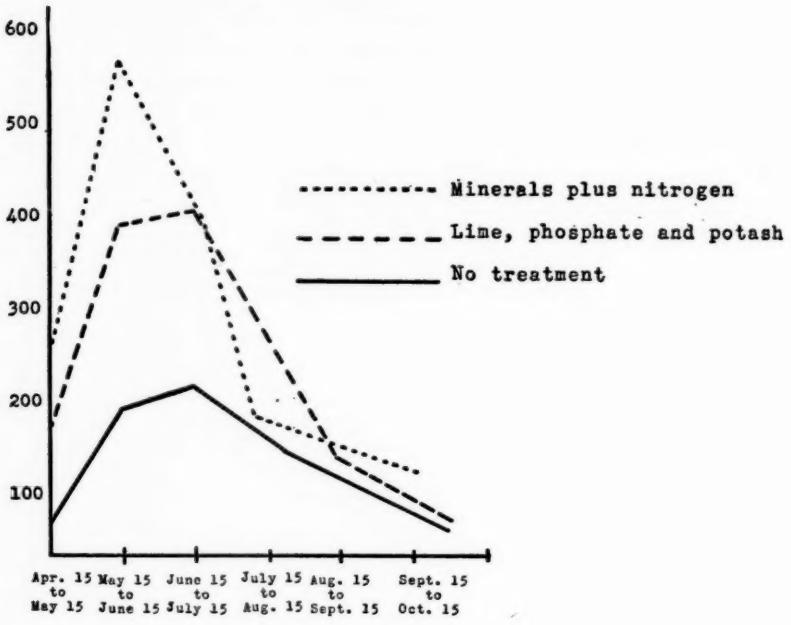


FIG. 1. SEASONAL PRODUCTION OF PASTURAGE*; AVERAGE FIVE YEARS, 1927–1931.

losses in weight. At this period of the year, when a high proportion of feed nutrients is being used for maintenance, additional feed has a higher than average value because it is used almost entirely for production. Some of the May and June growth may be carried over for use in July and August, but in the humid areas it has a greatly reduced value at this time.

The effect of fertilizer treatment on the seasonal distribution of pasturage is to increase the proportion of growth before the first

* Taken from Storrs Agricultural Experiment Station Bulletin 189, Storrs, Conn., August, 1933.

of July to about 60 per cent of the annual growth. This is illustrated in figure 1 showing the seasonal production of treated and untreated permanent pasture at Storrs, Connecticut for the five-year period 1927–1931.

About three-fourths of the increase in feed nutrients due to fertilizer treatment of permanent pasture occurs prior to July 1, *when an excess of growth above utilization ordinarily exists.* This has repercussions on the organization of the farm as a whole because most kinds of livestock must be fed before May and after June. If livestock numbers are increased to consume the increased seasonal growth, even greater emphasis must be placed on supplemental feeds for the balance of the pasture season and for winter use.

The fact that summer feed is cheaper than winter feed does not mean that livestock should be fed only in the summer. Cheap feed in May and June doesn't alter the necessity of providing higher cost feed at other seasons of the year, so that the low cost feed of May and June may be utilized. A tasty, well-cooked meal has very little value if served immediately following a holiday dinner.

On the other hand, nutrients in pasture may increase income by much more than the average value of feed, if available at low cost at a time when they may be substituted for harvested feeds. At a time when dairy rations are on a maintenance basis, an additional unit of feed theoretically would be worth at least two and one-half times the average value per unit during the entire production period because the additional unit would be used entirely for production, whereas 60 per cent of the feed fed to the average dairy cow must be used for body maintenance.

Ultimate Measure of Returns

Farmers' income constitutes the final measuring stick for determining the economic effects of changes in farm organization and operation. A farmer ordinarily is interested in changing his methods on the basis of the answer to two questions, namely: (1) Will the increased income from some proposed change in farming methods be greater than the increased expenses? and (2) Would some other substitution of methods make an even larger net return?

A study of the returns from individual enterprises and parts of enterprises is very much worth while if they are kept in proper perspective, but the final test is how the enterprises combine to produce income. One should not become lost in a maze of man-hours

per acre, cost per pound of digestible nutrients, feed cost per animal unit, and similar calculations, which are useful for some purposes, but which are not always closely related to farm income and earnings. A saving of man-hours represents no financial saving unless they are hired hours or unless some alternative opportunity for the profitable use of this labor exists. A farm organization with the smaller total labor utilization might have a greater expenditure for hired labor. When measuring the effects on income, one should be sure that he does not place a cash value on unmarketable products.

GEORGE W. COLLIER

Soil Conservation Service
RECEIVED AUGUST 30, 1941

A COMPARISON OF GRAPHIC AND PEARSONIAN COEFFICIENTS OF CORRELATION OF DATA DRAWN FROM A NONCORRELATED UNIVERSE*

THE DISTRIBUTION of mathematically computed correlation coefficients for random samples of a given size drawn from normally distributed universes with various degrees of correlation have been established. No such distributions are known for graphic correlations using free hand curves. It is doubtful in fact, that such distributions can be established on a mathematical basis because of the subjective element in the lines drawn through the same set of data by different investigators. We probably are forced in consequence to rely on actual experimentation to derive even an approximation for such distributions of graphic correlations. This note presents the results of such an experiment, where sets of ten and twenty observations have been drawn from a normal universe in which there is no correlation, and then simple correlations computed both by the ordinary mathematical method and by the graphic method. The variety of universes which may be set up for testing in such a manner is unlimited, but the correlations arising in samples drawn from a noncorrelated universe which are examined here is undoubtedly the more important case.

The procedure followed has been to sample a normally distributed universe with a mean of twenty and a standard deviation of three by the use of Tippets random numbers. Only whole digits

* Special acknowledgement is due to Mr. Shu-Chia Yang for his careful computation of the correlations involved in this analysis.

have been recorded. Three successive samples of ten were drawn and entered on a card as an X_1, X_2 and X_3 series. Such drawings were repeated one hundred times. The ten observations of X_1 on each card were correlated with the X_2 observations on the same card by the usual least squares method, resulting in 100 simple correlations between X_1 and X_2. A similar set of correlations were computed for the relationship between X_1 and X_3. The correlations are thus those occurring in random samples of ten observations drawn from a universe in which there is no correlation. The same sets of ob-

TABLE 1. DISTRIBUTIONS OF MATHEMATICALLY COMPUTED CORRELATIONS IN SAMPLES DRAWN AT RANDOM FROM A NONCORRELATED UNIVERSE

Correlations lying between plus or minus	Samples of ten observations			Samples of twenty observations	
	Theoretical expectation of an infinite no. of drawings	One hundred correlations between X_1 and X_2	One hundred correlations between X_1 and X_3	Theoretical expectation of an infinite no. of drawings	One hundred correlations
	Percentage	*Number*	*Number*	*Percentage*	*Number*
.0 – .099	21.8	15	28	32.7	33
.10– .199	20.4	16	15	27.8	27
.20– .299	18.0	24	18	20.0	23
.30– .399	14.8	17	18	11.7	9
.40– .499	11.1	12	6	5.5	7
.50– .599	7.4	8	10	1.9	1
.60– .699	4.2	7	2	.4	0
.70– .799	1.8	0	3	.0*	0
.80– .899	.5	0	0	0*	0
.90–1.00	.0*	1	0	0*	0
Total.....	100.0	100.0	100.0	100.0	100.0

* Less than .05 per cent.

servations were then correlated using the graphic method. Simple, smooth curves were employed such as would ordinarily be drawn in this sort of an analysis. We thus secure a comparison of the ordinary and the graphic method on the same sets of data. The analysis was extended to groups of twenty random observations by combining the data of successive cards. Both types of correlation were then applied to the sets of twenty observations. The mathematical correlations resulting from the drawings are compared in table 1 with the theoretical expectation for an infinite number of drawings. The results of the sampling experiment lie within the expected range of random fluctuations for such data.

The distributions of the graphic correlations which result from correlating the same data are shown in table 2. The distributions differ significantly for the same set of data. It appears that when the correlations on the ordinary straight line basis are high that the graphic correlations will be similar and usually only slightly larger regardless of whether there were ten or twenty observations. The situation differed somewhat when the mathematical correlations were low. With only ten observations the data resulting in low

TABLE 2. DISTRIBUTIONS OF ORDINARY AND GRAPHIC CORRELATIONS OF ONE HUNDRED SAMPLES OF RANDOM OBSERVATIONS DRAWN FROM AN UNCORRELATED UNIVERSE

Correlations lying between	Sets of ten observations				Sets of twenty observations	
	Correlations between X_1 and X_2		Correlations between X_1 and X_3		Correlations between X_1 and X_2 or X_3	
	Ordinary	Graphic	Ordinary	Graphic	Ordinary	Graphic
.00– .099	15	0	28	5	33	20
.10– .199	16	7	15	8	27	18
.20– .299	24	10	18	17	23	25
.30– .399	17	30	18	19	9	23
.40– .499	12	19	6	20	7	11
.50– .599	8	16	10	21	1	2
.60– .699	7	12	2	6	0	0
.70– .799	0	4	3	3	0	1
.80– .899	0	1	0	1	0	0
.90–1.00	1	1	0	0	0	0
Total.....	100	100	100	100	100	100

mathematical correlations was likely to produce materially higher graphic correlations. With twenty observations if only a very low correlation on the mathematical basis was present the graphic correlation was also very low in nearly all cases. The random occurrence of a marked curvilinear relationship appeared to be unusual with this number of observations.

Examination of the distributions of the correlations of the samples show them to coincide closely with expectation in the case of the mathematical correlations. The distributions of the graphic correlations are more skewed toward the higher values. The number of graphic correlations exceeding the values above which 5 and 10 per cent of the mathematical correlations are expected to lie are two to two and one-half times as great as the number of mathematical correlations. About half of the mathematical correlations for the

sets of ten observations may be expected to exceed about $r=0.25$ under these conditions, while it appears from this experiment that perhaps half of the graphic correlations will exceed $\rho=0.40$. With 20 observations in the correlation about half the correlations may be expected to exceed about $r=0.16$ while from this experiment one would expect about half of the graphic correlations to exceed about $\rho=0.25$. It would appear that correlations as large as $\rho=0.60$ or 0.65 would occur about once out of ten times in the case of graphic

TABLE 3. COMPARISON OF THE DISTRIBUTION OF COEFFICIENTS OF CORRELATION OF TEN OBSERVATIONS DRAWN FROM A NONCORRELATED UNIVERSE AND THE DISTRIBUTION OF THE LARGER OF TWO CORRELATIONS HAVING THE SAME DEPENDENT VARIABLE

Correlations lying between	One hundred correlations between X_1 and X_2	One hundred correlations between X_1 and X_3	Larger of the two correlations between X_1 and either X_2 or X_3
	Number	*Number*	*Number*
.0 – .099	15	28	6
.10– .199	16	15	6
.20– .299	24	18	21
.30– .399	17	18	25
.40– .499	12	6	12
.50– .599	8	10	17
.60– .699	7	2	9
.70– .799	0	3	3
.80– .899	0	0	0
.90–1.00	1	0	1
Total.....	100	100	100

correlations when random samples of ten are drawn from a universe in which the correlation is zero. About one correlation in ten appear to exceed $\rho=0.45$ under similar circumstances when the number of observations is twenty. The greater caution necessary in relying upon graphic correlations is thus apparent.

One further point may be illustrated with the data at hand. The procedure followed in many studies is to run several correlations between a given dependent variable and various independent variables and select the independent variable showing the highest correlation. Such a selective process changes the interpretation of the results and the probabilities of securing a correlation above that given in the tables of significance is greatly increased. In the case of the samples containing ten observations the X_1 series of each card has been correlated with both the X_2 and X_3 series on that

card. Selecting the larger of these two correlations and forming a frequency of the hundred cases we secure a distribution of correlation coefficients of the better of two correlations arising in samples of ten drawn at random from a non-correlated universe. The distribution of these correlation coefficients is shown in table 3. About twice as many correlations exceed the number at the five and ten per cent points as are expected for the correlations represented in the usual tables. The divergence from expectation would become greater if more independent variables had been included and the highest resulting correlation selected. The results are similar for the graphic correlations. It is evident that the interpretation of the significance of a correlation chosen in such a manner is greatly overestimated by the usual tables of significance.

WARREN C. WAITE

University of Minnesota
RECEIVED AUGUST 11, 1941

LEWIS ON RELATION OF INCOME TO FARM CAPITAL

A RECENT report by A. B. Lewis analyzes farm economic data collected by Prof. G. P. Scoville of Cornell University, over a period of 25 years, with the purpose of determining the relationships between income and capital in an intensive commercial fruit producing area of western New York.[1] A definite conclusion is reached: Operator's estimates of total farm capital for farms on different land classes are more closely related to the "capital and labor returns per man" capitalized at the average percentage ratio between this factor and total farm capital than to imputed values obtained by capitalizing any one of a number of other measures of income at the average percentage ratio of each respective factor. This conclusion held true not only for the averages for the 25-year period, but also for changes which occurred over the period. Since the factor, "capital and labor return per man," is an unusual term, it should be explained. It equals the sum of net farm income (on an inventory basis) plus expenses for labor, divided by the number of men dependent on the farm. This number of men includes the hired laborers and the operator, plus one to represent the owner of the farm.

[1] Relation of income to capital on farms, Newfane-Olcott Area, Niagara County, New York, 1913 to 1937, by A. B. Lewis, Economic and Credit Res. Div., Farm Credit Administration, U. S. Department of Agriculture, Washington, D. C., May 1941. (Processed.)

For the 25-year period, averages of various factors on the different land classes were as follows:

	Land class			
	III	IV	V	VI
A. Capital and labor returns per man...	$ 272	$ 421	$ 647	$ 801
B. Returns to capital.....	−233	102	662	1,262
C. Total farm capital.....	8,497	12,197	17,789	26,283
D. "A" capitalized at 3.34 per cent.....	8,144	12,605	19,371	23,982
E. "B" capitalized at 1.66 per cent.....	−14,036	6,145	39,880	76,024

In this demonstration, Lewis shows that by capitalizing average returns per man, he can approximate the average operator's estimates of values per farm for the four groups with an average error of 6.2 per cent. Contrasted with this, the use of returns to capital (assuming a uniform return to labor) gave an average error of 157 per cent.

It is of interest to note that close agreement between imputed total farm capital and the operator's estimates were also obtained by capitalizing net cash returns at 6.97 per cent (average error, 8.8 per cent), or by capitalizing labor returns per worker at 2.54 per cent (average error, 10.2 per cent).

One can readily agree with Lewis' conclusions that labor returns vary greatly on different land classes and that any method of estimating land values that assumes uniform labor returns on different grades of land will lead to erroneous results. Observations of apparent living standards in different areas in any part of the United States will confirm the truth of this conclusion. Such great diversity in labor returns within the small area included in an approximate township—the area from which the records used by him were taken —will perhaps surprise some people, but it can be readily confirmed by observation in any area where land varies widely in quality.

However, at two points the technique used is subject to question: first, the logic in counting the owner of the land as one man in determining capital's share; second, the use of farm income data to explain land values when such data do not include the complete farm income. In this case, the value of home-raised food and house rent were omitted.

Questions on the first point were raised both by A. A. Dowell and R. I. Nowell in comments on a paper presented by Mr. Lewis cover-

ing similar material at the National Conference on Land Classifications held at Columbia, Missouri, October 10–12, 1940.[2]

Lewis defends the logic of allowing one share to the owner in dividing the net income as follows: "The net income to the owner of capital is the same as the average net income to all who depend on the farm for a living, whether as owner, operator, or hired laborer. Such a relationship is reasonable, since there is no reason why a year spent in performing any one of the three primary functions on the same farm should be reimbursed at any higher or lower rate than a year spent in performing either of the other two functions." (Page 22.) Possibly not, but for this sentence to have any meaning, the owner of the farm must spend a year in performing the function of ownership. This he does not do; rather, he is paid for supplying capital, not time, and the only sensible way his contribution can be measured is by the rent equivalent of the capital furnished, and not by payment for time.

The fact that Lewis' method yielded close estimates is not of scientific significance if based on faulty logic. Certainly it is not logical to give the contribution of the owner of the property the same weight as the yearly equivalent of a group of itinerant apple pickers, regardless of the value of the capital supplied.

Turning to the second criticism, it seems reasonable that, if one is to attempt to explain land values on the basis of capitalized incomes, all sources of income should be included. In the data used by Lewis, the value of home-raised supplies and house rent were not included. Labor income was used as a measure of returns, and it was assumed that, in addition to the earnings as shown, the operator had the use of a home and certain home-raised foods and supplies. When these data are used to explain differences in value of land or total capital, all income should be taken into consideration, for value represents a capitalization of this income. It can be assumed that the value of a home plus home-raised food and supplies represents a larger percentage of the total income in the lower than in the higher land classes. Inclusion of this factor tends to reduce the differences between returns on farms of differing quality. If we assume that use of house and home-raised supplies yields an income of $40 per month and then assume that the appropriate labor return to the operator is the labor return per worker as calculated by Lewis, we get the following. On calculating this labor

[2] University of Missouri, Agr. Exp. Sta. Bul. 421.

return per worker, 5 per cent was allowed uniformly on the average value of the investment.

	Land class			
	III	IV	V	VI
A. Farm income	$ 382	$ 719	$ 1,283	$ 1,879
B. Value of farm products and rent	480	480	480	480
C. Total "A" and "B"	862	1,199	1,763	2,359
D. Labor return per worker	187	315	537	623
E. Difference between "C" and "D"	675	884	1,226	1,736
F. "E" capitalized at 7.19 per cent	9,388	12,295	17,051	24,145
G. Total farm capital	8,497	12,197	17,789	26,238
H. Ratio of "E" divided by "G"	7.94%	7.31%	6.89%	6.62%

By this method, the average error between the imputed and the actual values is 5.9 per cent. A large part of this could be eliminated by assuming that the value of the house and farm-raised food total about $10 less per month on Grade III than on Grades IV and V, and $10 more per month on Grade VI than on Grades IV and V. These would not be unreasonable assumptions.

It is thus possible by including an estimate for income omitted by Lewis to calculate imputed values that vary among the different land classes in approximately the same degree as the original values based on operator's estimates, and still follow usual capitalization procedures and eliminate the illogical device of assuming that the owner is entitled to a share equal to that of each worker. It is interesting to note that the rate of capitalization (7.19 per cent) used in the above calculation is a rather logical one in view of the character of the industry being studied, the income from which is rather variable from year to year. This rate can only be taken as approximate since the income from the value of the house and farm-raised supplies was a pure estimate. In view of the value for such items obtained for other areas, however, it may not be far from correct.

The most important fact that Lewis has demonstrated is the tendency for labor returns to diverge greatly among people on different classes of land—operators, hired men, tenants, all earn more on good land than on poor land. He has not demonstrated that rates earned on capital vary so widely.

What is the significance of this fact? One which he does not develop is that in calculating rates of return to capital for farms of different degrees of productivity, different allowances must be

made for labor returns. If the same allwances are made for operator's labor, regardless of productivity of the land worked, the rate of return to capital will be underestimated on poor land and overestimated on good land.

Lewis' point is similar to the method commonly used by investors in capitalizing landlord's income to check land values in areas where farm land is a common investment. This method automatically adjusts for the differential returns to tenants on different grades of land, but it does not assume that the owner gets the same share of the net returns as does each of the labor force rquired to operate the farm. It merely accepts the divisions customary in the community.

At the conference referred to above, Nowell also questioned the significance of Lewis' findings with respect to loan practice, pointing out that appraisals in the past have not been based upon capitalization of residual net incomes but upon judgments as to exchange values. On this point, it may be well to note what Lewis says: "The foregoing method of accounting for the value of farms on different grades of land is at variance with traditional methods to the extent that (these) assume that the returns to labor are the same on all grades of land." (Page 100.)

It is very questionable if appraisers assumed anything of the kind. What they were determining was the exchange value of the land—what it would sell for. Assumptions as to repayments or returns were not typically in their minds. Traditionally, real estate loans have been made on a collateral basis by all lenders, including the Federal land banks. Moreover, lenders, and particularly the Federal land banks, were and are under pressure to make maximum loans, particularly in areas of low productivity. Often the land bank is the only lender aside from sellers of farms, and the size of the loans which they will make may considerably affect the selling price of the land, as well as local opinion as to value. Some differences may may have been made in this respect since 1933, but it is still probable that collateral values loom large in the minds of most appraisers. The processes by which these values are established—whether complete mobility and equal returns to labor are assumed, or what not—very likely never enters the mind of the appraiser.

It is true that the loans on low-valued lands have broken down more commonly than on good lands. There are two primary reasons: (1) a large part of the income on the low-valued lands is

noncash—that is, the value of home and home-raised supplies—and these cannot be applied on loan payments; (2) the net cash income may be so low that, when reduced by adverse circumstances, it leaves no surplus above the minimum cash costs of family living. In other words, on low-quality land, we have values based more largely upon noncash incomes and incomes so low as to leave little margin of safety above living costs. As a matter of policy, the only way in which lenders can minimize losses in such areas is by making conservative loans and avoiding areas where incomes are so low as to provide a bare subsistence for those who work the land.

This report is worth the study of any student of farm economics. It illustrates how a long series of data, such as has been accumulated by Scoville, can be used in testing theories. It clearly points out the effects of changing economic conditions on incomes and land values and the static effect of differences in soil classes upon incomes and values in an area of commercial farming.

L. J. NORTON

University of Illinois

RECEIVED AUGUST 25, 1941

NOTE ON PART-TIME FARMING

PART-TIME FARMING as an agricultural occupation and appropriate research methods in this field have been discussed several times in the pages of this journal.[1] Popular interest in the subject has encouraged scientific investigation by workers in many states.[2] In popular discussion, part-time farming is frequently treated as an escape from the insecurity of complete dependence on specialized industrial or agricultural earnings, or as an opportunity to utilize idle hours to supplement the principal source of income. Workers in agricultural economics have frequently analyzed part-time farming without furnishing much real enlightenment concerning the bases for these popular assumptions.

It appears to the writer that the character of modern industry and agriculture at once precludes any extensive development of part-time farming through synthesis of the two occupations. A job

[1] See L. A. Salter, Jr., What is part-time farming?, JOUR. FARM ECON., 18(1), February, 1936, and L. A. Salter, Jr., and L. F. Diehl, Part-time farming research, JOUR. FARM ECON., 22(3), August, 1940.

[2] The second reference in footnote 1 lists 24 experiment station and government research agency reports on part-time farming.

in either industry or agriculture is a full-time job if carried out efficiently. Part-time farming is ordinarily carried on by numerous individuals who have a host of special reasons for such occupation, including poor health, savings, inability to secure steady employment, or preference for a home in the country. In addition, there is a certain amount of transitional part-time farming characteristically temporary in nature.

Such vague findings concerning the origin of part-time farming have been characteristic of all research, yet definite conclusions regarding part-time farming have been applied indiscriminately to situations involving distinct industrial and agricultural occupations. Clearly, generalized studies of part-time farming afford little useful information concerning the nature of part-time farming as applied to persons in distinct occupations. Analysis of the part-time farming activities of definite types of workers in specific situations is essential if research results are to have any useful application.

Working from this point of view, the Louisiana Agricultural Experiment Station made a study of the part-time farming activities of the employees of a large paper and pulp mill located in a small town in an agricultural area poorly adapted to farming.[3] The employees of the mill had ample opportunity for farming, since they worked six-hour shifts and good roads furnished access to numerous farms within 10 miles. Several interesting conclusions developed from study of their activities. Part-time farming did not result from the employment of farmers in industry, but from the movement of mill workers to the country. Low-income workers did not engage in farm activity, since they had neither the income to purchase a farm and commute to work nor the initiative to combine and manage two sources of income. Part-time farmers were uniformly the workers receiving wages above average, or minor executives, who regarded the farm primarily as an investment of savings in real estate rather than as a source of supplemental income. Earnings on the farms were generally confined to the value of farm products used in the home, with those workers attempting commercial operations finding that hired labor, feed, and fertilizer costs usually equaled or exceeded the receipts from crops and livestock.

The Louisiana study indicated that paper mill workers on short shifts who earn sufficient wages to permit savings can reduce living

[3] C. A. Boonstra and Hilliard Jackson, Part-time farming in a rural-industrial area of Louisiana, Bull. 333, Louisiana Agr. Exp. Sta., June, 1941.

expenses and establish a more comfortable home by engaging in part-time farming. Probably more important was the fact that industrial workers who are not disposed to work long hours in addition to factory employment, who regard a part-time farm as desirable only if it returns a cash income, and whose earnings are insufficient to establish a good rural home, will be disappointed in attempts at part-time farming. A country home may be an expensive luxury for a factory laborer.

Obviously, important observations can be derived from these findings relative to the possibilities of part-time farming in relieving problems of industrial insecurity or low farm income. Since a farm home requires an investment of savings, low-income workers cannot afford this luxury. Since earnings are confined largely to produce used in the home, part-time farms are not likely to become a significant phase of commercial agriculture. Finally, the fact that the better paid workers, or persons with unusual sources of off-farm income, are those who engage in part-time farming, removes any urgent necessity for detailed study of the costs and returns from this type of agricultural activity. The study of part-time farming is largely a problem in consumption economics, since production problems are submerged in a confusion of personal desires for home location, unusual income situations, and indifferent utilization of productive resources and consumption goods for non-pecuniary satisfaction.

C. A. BOONSTRA

Louisiana State University
RECEIVED JULY 7, 1941

FAMILY INTEREST IN THE OWNERSHIP OF FARM LAND

MEMBERS OF land-owning farm families are affected by the way their land is held. Oftentimes the ability of a family to remain intact and continue a wise use and management of land after the termination of a present ownership depends upon the kind and quality of interest possessed by the member or members of the family holding title. Present land-use, future farm business plans, and the ability to sell or mortgage depend to a large extent upon the kind of estate possessed by the present owner and upon the disposition which will be made of the property when that interest ends.

The situation presented when an aged or infirm person becomes the owner of farm land, or when a woman with several small children is left the responsibility of caring for them out of personal or investment earnings, focuses attention on desirable ways of holding and conveying farm property.

Generally speaking, the legal interest which an owner may have in real estate varies from the so-called fee simple absolute, which is the highest type of ownership, to contingent interests based upon events or happenings which make ownership a very precarious and uneconomic right. Between these extremes lie many kinds of ownership, some well adapted to particular situations, some not so well adapted.

When the owner of a fee simple dies without having made a will, the property descends to his heirs, subject to the dower interest of the surviving spouse. Each state has laws regulating descent and dower. Suppose, for example, that the owner of a 160-acre farm in Illinois died leaving his wife and four children. The children will each be entitled to 40 acres, subject to the dower interest of the widow, which amounts to a life estate in an undivided one-third of the 160 acres. If she does not elect dower, she will take one-third of the 160 acres, or approximately 53 acres, absolutely. The four children will then get about 27 acres each. In such situations the breaking up of the inheritance may have several deterimental effects: One child may attempt to buy out all the other interests and become heavily indebted; the children may sell their portions to adjoining owners, thus definitely terminating the existence of what may have been a productive farm unit; the partitioning of the property between the widow and heirs may be costly and slow, eventually burdening the land and perhaps subjecting it to unwise use during the time it is an unsettled estate; also, the decision on the part of the heirs to remain as tenants in common and have the property operated as an estate is not always a happy one, due to a frequent lack of competent and interested management. To prevent the occurrence of any of these unwelcome events, the family should reach an agreement which will assure the most economic disposition of the property in the event of death. It should then be the responsibility of those who hold title to the property to see that arrangements are made which will further the best interests of the family. Competent legal assistance is invaluable in making such arrangements.

Suggested Methods of Holding Title Under Different Family Situations

Let us assume that a young farmer and his wife, without children, have inherited the farm, or at least a part of the farm, on which they live, or that they have acquired a farm before they acquired children. Since the successful operation of farm land is a joint enterprise involving willing and intelligent cooperation between husband and wife, they will be equally interested in the ownership and use of the land, and will wish to assure themselves that their assets either can be used or disposed of with as little interference and expense as possible, in case either of them should die. Even though there are no children, a fee simple ownership in one party would still be subject to at least three objections in case of the death of the owner: the estate would have to be administered, which is costly at best; there would be a period of time during settlement when the free use of the property by the surviving spouse would be hampered; and by the laws of descent in some states at least part of the land would go to the deceased's family.

Joint Tenancy

In the above case, a joint tenancy would probably be preferable because in the event of death of one party it has the effect of immediately passing the title and ownership of the land to the surviving spouse. In addition, the cost of administration is obviated. By a joint tenancy is meant an undivided ownership of property by two or more persons, each of whom has the so-called "right of survivorship," or right to immediately take all of the property or his increased interest in it upon the death of one of the joint tenants. Because such ownership by husband and wife has in the past been used to defeat the claims of creditors, the law of some states requires that a specific statment that a joint tenancy rather than a tenancy in common is intended, appear in the deed. Otherwise, the conveyance will be called a tenancy in common, which differs from the joint tenancy in not carrying the all-important right of survivorship. When a tenant in common dies, his share must be set aside and administered.

With the advent of children, the farm family may wish to make some arrangement other than a joint tenancy between husband and wife. As long as the children are dependent, joint tenancy may represent the best type of ownership, but if there are boys interested

in the farm and its operation, it might be desirable, after their education is completed, to make conveyances including them as joint tenants. If there is more than one interested son and the farm is small, it may be wise to provide for a continuance of ownership in only one of the sons and give the others help in becoming established in business or on another farm. If the sons are not interested in farming and there are daughters in the family who are, there is no reason why a similar arrangement should not be made with respect to them—presumably a daughter has as much right as a son to generate her posterity on the home farm.

A conveyance to one son with charges on the land in favor of the other children is another possibility. The charges should be reasonable so they will not burden the land. They can be evidenced by a series of notes of varying maturity dates made out to the other children and making the land security for their payment.

Life Estates and Remainders

A method frequently used by farm owners to settle the title to their property before death and insure its passing on to one interested in operating it is the creation of a remainder in the desired recipient and the reservation of a life estate in the owner. This allows the present owner continued use and income until he dies. At death all rights to the property pass immediately to the remainderman, without administration. When life estates are created in this manner, voluntarily, the life interest is not likely to be detrimental to the interest of the remainderman. As a matter of fact, the remainderman will probably be on the farm as a tenant of the life tenant long before his remainder matures. However, when life estates result from operation of law or are not reserved in the grantor, the interests of life tenant and remainderman are frequently divergent. This may occur when the grantor creates a life interest in one party, his wife for example, and a remainder in someone else, usually children or grandchildren. In such cases the farm is frequently exploited by the life tenant and the interest finally coming to the remainderman is much less than it might have been. Due to the intricacies of human nature this may happen even as between closely related persons.

Trust Arrangements

Frequently an owner of land, interested in having his descendants receive an income from the property after his death, feels that no

one in his family has the interest or ability necessary to handle the farm either as an operator or landlord. In such cases it is possible to convey the land to trustees to manage and pay the income to named beneficiaries. A professional farm management agency might be made trustee. A farm owner who is responsible for the support of small children, a wife, aged parents or other relatives may find it desirable to have a will which would create a trust for the benefit of these dependents in case of his death. If he lives and some of the children become interested in farming the will could be altered and a joint tenancy or remainder created in favor of the interested children.

Many other arrangements are possible. A deed of the fee with immediate right to possession is the most unconditional way to pass the property on, providing the owner is financially able to retire and live without income from the farm. Regardless of the method used, every owner of farm lands should:

1. Procure an up-to-date abstract for his property.
2. Do whatever may be necessary to clear the title.
3. Determine, with the help of members of the family and other interested and competent persons, what form of present and future ownership will best conserve the farm as a unit of production and also serve the best interests of the farm family.
4. Have prepared such legal documents as are necessary to effectuate the agreements reached.

H. W. HANNAH*

University of Illinois
RECEIVED AUGUST 27, 1941

MERITS AND LIMITATIONS OF SOME OF THE MEASURES OF LAND CLASSES

THERE IS no precise measure of land classes. It is necessary, therefore, in most studies in the economic classification of land, to use two or more measures of land classes, each of which serves as a check on the others. In the land-classification studies in Delaware, and in some of the other states, five measures of land classes have been used. When the results obtained through the use of the different measures do not check reasonably closely, the question arises as to the relative merits of the different measures under varying sets of conditions.

* Assistant Professor of Agricultural Economics; Member of Illinois Bar.

Crop Yields

Probably to many, crop yields appear to be one of the best measures of land classes. That is, good land normally produces high crop yields and poor land produces low crop yields. However, a considerable proportion of the land being classified oftentimes is not utilized for cropping purposes. In Sussex County, Delaware, 54 per cent of the land is timber and other untillable land not in pasture. This does not include pasture land for which there is no practical means of obtaining yields.

On most farms in the poorer land classes, only the better fields are cultivated. The poorer fields usually are in pasture or may be idle. The crop yields in these cases represent the yields on the better parcels of land, and no index of the productivity of the poorer parcels of land is obtained. It is also usual on these farms to grow a relatively small acreage of cultivated crops and to put most of the barnyard manure on these limited areas. Under these circumstances, the crop yields are larger than if the usual proportion of the land had been in cultivated crops.

Crop yields, then, are a good measure of land classes, where the land is devoted to the production of crops. They become of less value when a considerable proportion of the land is in other uses than crop production, and they obviously are of no practical value in areas in pasture, timber, and untillable land.

Size and Condition of Buildings

In general, size and condition of buildings is a reasonably good measure of land classes. Normally, good land requires larger buildings to store the crops and shelter the livestock than does poor land. Likewise, good land usually supports an improved condition of farm buildings.

However, there are exceptions to this general situation and under certain conditions the exceptions tend to become general. In areas which lie adjacent to large metropolitan areas, a large proportion of the farms may be owned by urban people. In these situations, the farms are often supported by city capital and the size and condition of the farm buildings may bear little relationship to the class of land. This situation had to be taken into consideration in using size and condition of buildings as a measure of land classes in New Castle County, Delaware, where the City of Wilmington is the county seat.

Size and condition of buildings may be of less value as a measure of land classes in areas where there are important enterprises which have little relationship to land use. In Sussex County, Delaware, the poultry enterprise affords the chief source of income. The poultry enterprise (especially broiler production where practically all the feed is purchased) has no marked relationship to land use. In fact, the broiler enterprise in this county is concentrated, to a marked degree, on land that is submarginal for cropping purposes. Obviously, in this county, specialized poultry plants do not accurately reflect the class of land and were, therefore, omitted in the classification of farm buildings.

Condition of farm buildings at times may reflect more accurately the personal habits of the owner than the class of land. Evidence of this may be observed in most counties. In these cases, probably the size of buildings would be a more accurate measure of the land class than would the condition of buildings.

Net Farm Income

Net farm income obtained on a reasonable number of representative farms, normally, is a valuable measure of land classes. In Delaware, it was used only in the first county studied because of the high cost of obtaining the data. It involves the obtaining of complete labor-income records. Its weakness becomes evident in areas where an appreciable proportion of the farm income may be derived from enterprises that are not closely associated with land use. This situation often occurs in areas near large cities. In northern New Castle County, Delaware, the area which is adjacent to the City of Wilmington, more than one-third of the gross income is derived from this type of product; namely, poultry products, garden products, flowers, cooked foods, and mushrooms. In these situations, net farm income if used as a measure of land classes, has to be used with considerable modification. In the case of the commercial broiler area in Sussex County, Delaware, net farm income as a measure of land classes would be distinctly misleading because the broiler enterprise has been relatively profitable and it tends to be concentrated in areas submarginal for cropping purposes.

Soils

Where soil survey maps are available, soil types become one of the most widely used, and most effective measures of land classes.

Their weakness lies in the fact that soil types indicate only physical productivity of land and do not accurately indicate economic productivity of land. Economic productivity of land involves both physical productivity and location values. Assume a parcel of land located near a shipping point is of a soil type and a physical productivity which barely allows it to be placed in a certain economic land class. If a parcel of land of the identical soil type and physical productivity were located at a distance from the shipping point, the parcel of land obviously would be placed in a lower economic land class.

Assume further that a parcel of land is of a soil type that is not suited for cropping purposes but does produce fairly good pasture. If this land were located adjacent to land submarginal for agricultural purposes, it would be classified as submarginal. However, if the same parcel of land were located adjacent to land supramarginal for agricultural purposes, it may be classified as supramarginal. A parcel of land in itself may be submarginal for agricultural purposes but when managed in connection with a good farm it may become supramarginal for agricultural purposes. Untillable pasture land may be a distinct asset to a "going" farm.

Intensity In the Use of Land

Intensity in the use of land (forestry being the least intensive use and truck and fruit crops being the most intensive use) probably is the most reliable single measure of land classes. Farmers, over a long period of years, through the process of trial and error and economic loss, have found, in general, the use for which the different parcels of land are best suited under existing conditions. It is true there is usually a lag in land-use adjustment which the research work must take into account. The chief disadvantage of intensity in the use of land as a measure of land classes, is that land-use mapping is expensive to do.

In general, because there is no precise measure of land classes, the research worker in land classification needs as many different measures as he can devise; each to act as a check on the others. The final land-classes will be a compromise between the several measures that have been used. However, conditions in most counties vary and it is seldom that the same land-class measures can be used in two counties without some modifications. In classifying

land in different counties it may be necessary to adopt some new measures; discard others; attach varying weights to some; and to modify others according to the particular economic and physical conditions within a county.

R. O. BAUSMAN

University of Delaware

RECEIVED SEPTEMBER 19, 1941

PUBLICATIONS RECEIVED

Bakken, Henry H., and George Max Beal, *The Cost of Manufacturing and Marketing Sugar in Wisconsin*, Madison, Wisconsin, Mimir 1941. 27 pp. 50 cents.

Bornemann, Alfred, *J. Laurence Laughlin, Chapters in the Career of an Economist*, Washington, D. C., American Council on Public Affairs. 1940. 97 pp. Cloth edition $2.50, paper $2.00.

Buros, Oscar Krisen, Editor, *Research and Statistical Methodology, Books and Reviews, Second Yearbook*, Highland Park, N. J., Gryphon Press. 1941. xx+383 pp. $5.00.

Douglas, Paul H., and others, *Economic Mobilization*, Washington, D. C. American Council on Foreign Affairs. 1940. 43 pp. 75 cents.

Elwood, Robert B., Arthur A. Lewis, and Ronald A. Struble, *Changes in Technology and Labor Requirements in Livestock Production: Dairying.*, U.S.D.A., Bureau of Agri. Economics. 1941. 86 pp. (mimeo.). This publication together with the one on *Poultry* by George A. Sallee and others, and the *Index* prepared by Sarah L. Yarnall to be found elsewhere in this list, complete the series of monographs prepared by the National Research Project of W. P. A. on Changing Technology and Its Effects on Agricultural Employment. These concluding publications have been mimeographed and made available by the Bureau of Agricultural Economics.

Farm Foundation, *The People, the Land and the Church in the Rural South*, Chicago, Ill., Farm Foundation. 1941. 232 pp. (mimeographed) 25 cents. A collection of over 20 papers read at a conference held at Nashville, Tenn., May 9–11, 1941. The papers deal with many of the principal social and economic problems of the Rural South and were prepared by leading southern economists and sociologists. The discussion is divided into five parts: I. Basic Economic and Social Conditions, II. Relation of Tenancy to Living Conditions, III. The Place of the Church in Rural Southern Communities, IV. The Relation of the Church to Other Agencies, and V. What the Church Can Do.

Galloway, George B. and Associates, *Planning for America*, New York, Henry Holt and Co. 1941. 713 pp. $3.00 ($4.00 trade edition). (Reviewed in this issue.)

Hart, Albert Gailord and Edward D. Allen, *Paying for Defense*, Philadelphia, Pa., The Blakiston Company. 1941. 275 pp. $2.50.

Hopkins, John A., *Changing Technology and Employment in Agriculture*, U. S. Dept. of Agr., Bur. Agr. Econ., 1941. 189 pp. (Reviewed in this issue.)

Illinois Tax Commission, in cooperation with Work Projects Admin., *Survey of Local Finance in Illinois*, vol. 7, *Drainage District Organization and Finance 1879–1937*, Chicago, Ill., Illinois Tax Commission. (Reviewed in this issue.)

Kaplan, A. D. H., Faith M. Williams and Marjorie S. Weber, *Family Income and Expenditure in Nine Cities of the East Central Region 1935–1936*, Vol. II, *Family Expenditure*, U. S. Dept. of Labor, Bur. Labor Statistics, 1941. 390 pp. 45 cents.

Kellogg, Charles E., *The Soils that Support Us*, New York, Macmillan. 1941. 370 pp. $3.50.

Kiekhofer, William, H., *Economic Principles, Problems and Policies* (Revised) New York, D. Appleton-Century Co. 1941. xxxi+906 pp. $4.00.

Lerner, Max, and others, *Design for Defense*, Washington, D. C., American Council on Public Affairs. 1941. 40 pp. 50 cents.

May, Samuel C., Director, Univ. of California, Bur. of Public Administration, *Farm Wage Boards*, 1941 Legislative Problems, No. 8, Berkeley, Cal. (mimeo.). 1941.

Meyers, Albert L., *Elements of Modern Economics*, New York, Prentice-Hall, Inc. 1941. 425 pp. $2.50.

Mitchell, Donald R., *Farm Accounting*, New York, McGraw-Hill Book Co. 1941. 231 pp. $2.50. (Reviewed in this issue.)

Monroe, Day and others, *Consumer Purchases Study*, U. S. Dept. of Agr. Bur. of Home Economics in cooperation with Work Projects Administration. The following bulletins in this series have appeared recently: Kyrk, Hazel, Day Monroe and others, *Family Housing and Facilities, Five Regions, Urban, Village, Farm.* Misc. Pub. 399. 1940. 223 pp. 25 cents. Hollingsworth, Helen, Day Monroe and others, *Family Expenditures for Medical Care, Five Regions, Urban, Village, Farm.* Misc. Publ. 402. 1941. 241 pp. 30 cents. Stiebling, Hazel K., Day Monroe and others, *Family Food Consumption and Dietary Levels, Five Regions, Farm Series.* Misc. Publ. 405. 1941. 393 pp. 35 cents. Monroe, Day, Dorothy S. Brady, and others, *Family Expenditures for Automobile and other Transportation, Five Regions, Urban, Village, Farm.* Misc. Pub. 415. 272 pp. 30 cents.

New Zealand, *Official Year Book, 1941*, Wellington, N. Z., Census and Statistics Dept. 1941. xii+928 pp., 7s. 6d.

Sallee, George A., and others, *Changes in Technology and Labor Requirements in Livestock Production: Poultry*, U.S.D.A. Bureau of Agri. Economics. 1941. 57 pp. (mimeo.).

Schultz, Theodore W., *Training and Recruiting of Personnel in the Rural Social Studies*, Washington, D. C., American Council on Education. 1941. 340 pp. $3.00. (Review article in this issue.)

Shepherd, Geoffrey S., *Agricultural Price Analysis*, Ames, Iowa, Collegiate Press. 1941. 402 pp. $3.75.

Waines, W. J., *Prairie Population Possibilities*, Ottawa, Canada, Royal Commission on Dominion-Provincial Relations. 1939. 77 pp. (mimeo.).

Woodward, Carl Raymond, *Ploughs and Politicks, Charles Read of New Jersey and His Notes on Agriculture, 1715–1774*, New Brunswick, N. J., Rutgers Univ. Press. 1941. xxvi+468 pp. $5.00. Chiefly the *Notebook* of Charles Read, a gentleman-farmer of New Jersey, of the third quarter of the 18th century. Contains some interesting notes and observations, but would have profited from more severe editing. The first 225 pages are given over to a biographical sketch of Read's life. The next 175 pages consist of Read's *Notebook* together with introductory and explanatory material by Mr. Woodward. The Notes contain a hodge-podge of material ranging from observations on how best to use manure to how to hang a gate, and from rates of gains on hogs and cattle to directions for removing spots from clothing.

Yarnall, Sarah L., *Studies of Changes in Technology and Employment in Agriculture—Index*, U.S.D.A. Bureau of Agri. Economics. 1941. 63 pp. (mimeo.).

REVIEWS

Social and Economic Aspects of Swedish Population Movements, 1750–1933, Dorothy Swaine Thomas. New York. The Macmillan Company, 1941. Pp. 487. $6.00.

A European student of population trends who came to this country recently commented that he had finally learned why American workers in this field were such good statisticians: they had to be; their data were so bad that only the best statisticians could make anything out of them. In *Social and Economic Aspects of Swedish Population Movements*, a competent American statistician has turned her attention to the carefully compiled data for Sweden, which go back to the middle of the eighteenth century and has devised methods of analysis that not only tell the story as it developed in Sweden, but that provide leads for the handling of the growing body of population data which are being assembled in this country. In a wealth of tables, highly suggestive pictorial devices, and crisp textual statements, she presents the development of population trends in a country which experienced a relatively large net emigration to the United States, and in which birth rates subsequently fell to levels so low that in recent years the net replacement rate was only about 75 per cent per generation.

When the nation was primarily dependent upon agriculture a direct connection between vital rates and harvests could be observed, but as industrialization proceeded, the major factors in the continued decline were due to other social and economic elements. Death rates were never directly dependent on business cycles, birth and fertility rates fluctuated independently after the 1890's, and only marriage rates continued in close dependence upon business cycles through the whole period. Especially since World War I the spread of the pattern of family limitation proceeded so rapidly and so undirectionally that the impact of industrial conditions in the primary demographic sphere practically disappeared during this period. Both industrialization and urbanization are important; the decline in fertility was most rapid in the urban areas, and when age and proportion married are taken into account, it is found to have progressed least rapidly in the agricultural areas.

The migration of more than a million and a third from the Swedish population after 1850 provides a mass of material for testing one of the major problems in relation to both internal and foreign

migrations; the extent to which they respond to the push of unfavorable conditions at the place of origin or the pull of favorable conditions at the place of destination. Dr. Thomas shows that from 1870 to 1908 the correlation between net emigration and the harvest index was practically zero, but that between net emigration and American business cycles it was +.67. The main push from agriculture was latent and lasted well through the 1880's. By the end of the nineteenth century the development of industrial opportunities in the country had provided an outlet for it, and the rise and fall of American prosperity was the major factor in the wave-like movement of emigration from the early seventies. The "pull" of industrial opportunity appears also to have been an important element in internal migration between the agricultural communities and towns. For the period 1895 to 1933 the negative correlation between net internal migration from agricultural communities and business cycles was −.74 for males and −.68 for females; and the positive correlation between migration to towns and business cycles was .60 for males and .46 for females. The trend of migration is continuously from agricultural communities; depressions appear to slow it down rather than to reverse it.

One of the major methodological contributions of the book is in the handling of the data for a large number of minor civil divisions. The 2,600 communities are grouped, not into geographically contiguous units, but according to their occupational structure, composition of the industrial labor force, administrative functions, predominance of special industries, historical development and size of population, area in cultivation and density of population, records of industrial enterprises and other sources. From this resulted a classification into agricultural, rural mixed, and rural industrial communities, as well as several groups which changed their classification, and six groupings for the towns. The detailed parish registers which provide a continual record of births, deaths, migrations, and population were then compiled for each of these groups.

The analysis of internal population mobility illuminates further the relation between the gross volume of migration and the net result of these migrations. Data from those European countries in which internal migrations are carefully recorded, as well as fragmentary data from the United States, have indicated that the net result of migration is likely to be only a small fraction of the total volume of movement. Dr. Thomas shows that in Sweden, in 1895,

between 78 and 97 per cent of the internal migrants, depending on community type, had no net effect on quantitative population change, and in 1933 the comparable figures were between 90 and almost 100 per cent. The great bulk of internal migrants consists of opposing streams inward and outward which tend numerically to cancel each other, and this tendency has become more pronounced in the course of time.

The findings of this study could not be translated directly into American terms without extensive research. Moreover we do not now have such complete data as were available in Sweden. But the samples of the findings given above indicate that the reader will get many suggestions of relationships which would be useful for studies in the United States. Dr. Thomas is painstaking in presenting fully her data and the steps in the analysis; 211 pages are devoted to a presentation of the data used; in addition there are 70 charts, and appendixes devoted to a discussion of the techniques, including the determination of the constants used in computation of the trends. The interested reader could readily recombine the data to check on any conclusion given, or to arrive at others. If he should prefer to define mobility as the ratio of total migrants to population, rather than as only the compensated portion of the total migration, he could do so readily.

The chief purpose of this book, which is one in a proposed series of three, is to present the data and new methods used in their analysis. If analogy may be used, the raw materials were of a high quality, the spinning was done with expert techniques, and the resulting skeins withstand the most rigid scrutiny. The finished pattern into which they will be woven is promised for the next volume which is now in preparation.

CONRAD TAEUBER

Bureau of Agricultural Economics

Changing Technology and Employment in Agriculture. John A. Hopkins. Bureau of Agricultural Economics, U.S.D.A. May 1941. Pp. 189.

The appearance of this monograph serves as a reminder of two publications of similar title: the recent "Technology on the Farm" and Quaintance's study of 1904.[1] Although the titles of the present

[1] The influence of farm machinery on production and labor. H. W. Quaintance. Pub. of the American Econ. Assoc. Third Series, 5(4): 1904.

study and the one of 1904 are very similar there is a striking difference in the resources available for the respective investigations. When Quaintance undertook to estimate the labor saving potentiality of farm machinery he relied chiefly on the census reports for general information and especially on a study made in 1899 by the Department of Labor comparing hand and machine methods.[2] The improvement in source material—a large number of farm management studies, more detailed census material, unpublished material in possession of the Bureau—and the scope of the present study both pay testimony to development of research work in agricultural economics.

This research effort was carried out as a part of the general W.P.A. National Research Project on "Reemployment Opportunities and Recent Changes in Industrial Techniques." Mr. Hopkins was in charge of the agricultural part of the over-all project; about a dozen special monographs on technology and agriculture have been issued already by the W.P.A., including analyses in trends of employment, a volume of references on practices and use of labor on farms, and studies of changing labor requirements in the production of major crops and changes in farm power and equipment. The present bulletin is a summary and integration of the whole project, addressed to an appraisal of the "effect of technological changes on employment in agriculture since 1909."

This monograph covers much the same ground as the recent Special Report on "Technology on the Farm," with some of the studies of changing labor requirements being used in both studies. However, the Special Report was aimed primarily at exploring the significance of technological change for national policy and programs. By contrast, the present monograph reflects a primary intent to find the facts.

It may be characterized as an answer to the question, "What are the facts regarding the effects of technology on farm employment?" But facts are not self-contained entities; they depend on the point of reference from which events are analyzed. In this case, the point of view is fundamentally that of farm organization, if the reviewer has read understandingly. The product is a monograph in which

[2] Ibid., p. 19 ff. Rogin has pointed out the shortcomings of both this labor study and Quaintance's interpretation of it, especially with reference to wheat production: The Introduction of Farm Machinery in its Relation to the Productivity of Labor in the Agriculture of the United States during the Nineteenth Century. Leo Rogin. Univ. Cal. Pub. in Econ., 1931, 9: esp. pp. 214–243.

presumably all the available evidence has been marshalled and analyzed for the primary purpose of showing how technological developments since 1909 have influenced farm employment. As a tabulation of evidence the bulletin may well become a handbook of reference for the field studied. Yet it is an analysis and not a compilation.

The investigation covers the whole economy of agriculture, with the concluding argument reviewing the relations of agriculture to the other sectors of the economy through considerations of demand, foreign trade, and problems of the current farm adjustment programs. Perhaps it would be more accurate to say the farm economy herein investigated is conceived as a productive mechanism, a mechanism which incorporates as a residue the consequences of past decisions on and experience with farm technology. Within this universe, the relations of technology to farm employment are studied at successive points of time. The argument which integrates the various parts of the study consists chiefly of theoretical concepts of the economics of enterprise. In various places in the monograph the author argues phases of the theory of the firm; for example, the discussion of the combination of factors of production in the early paragraphs of Chapter V on the mechanization of agriculture.

The publication is so solidly factual, that a review can scarcely suggest the extensiveness of the coverage. But if one desires such comparisons by type of farming regions, as: the importance of hired labor, the length of working hours of farm operators vs. that of hired workers, average per capita hours worked on farms per year, capital invested per worker, amounts of labor used in different operations, per acre, per bushel, and in the aggregate, he will find the available material analyzed and interpreted; provided, of course, that answers are sought for the order of questions considered in the study.

The analysis comes to a focus in Chapter VIII, which deals with changes in labor requirements on several of the principal crop and livestock enterprises. Among the many comparisons made one finds that corn production required 20 per cent less labor with the techniques of 1932–36 than with those of 1909–13. This reduction was equivalent to 200,000 man-years of labor. Wheat production required less than one half the man-hours per acre in the latter period as in the earlier one. Milk production required 7 per cent less labor per hundredweight in 1932–36 than in 1909–13. But the

volume of dairy production increased sufficiently during the interval so that in the aggregate 44 per cent more labor was used in the later period. According to these estimates farmers in the corn belt spent 8 per cent more time on milk production than they did on corn during 1932–36; in the pre-war period they spent less than 60 per cent as much time on milk production as they did on corn. The farmers in the small grain belt also spend more time in producing milk than they do on oats and wheat combined (p. 138). These are a few of the measures of technological changes over recent decades.

Although the monograph will surely stand as a competent and extensive analysis of the effects of technology on farm employment yet I find myself puzzled about the way the guiding hypotheses in the study relate to some broader theoretical questions. At the very core of the study, for example, there may be something of a contradiction. Perhaps I have missed the point, but how does one investigate an (external) technological process in terms of a theory which defines equilibrium of the firm by taking the external world as data? And does the culmination of the analysis into estimates of changes in man-hour requirements reflect the traditional view that machinery is a "labor-saving" factor; or does it reflect a conclusion, in which Commons and Marx might concur, that one uses man-hours to measure great economic changes because study of the net pecuniary position of the firm leaves one without a method of following inherent continuities.

Or, again, of what value is Veblen's analysis of technology and capital in studying such a problem as this? Veblen was especially impressed by the validity of considering technology as a great historical process with a continuity of its own—the "concatenation" of industrial events. There are places in the bulletin where Mr. Hopkins expresses himself almost in Veblenian terms, for example, in the comments on the evolution of farm machinery, p. IV, and on social capital—"in the form of technology—our way of doing things." (p. 179). Yet in Veblen's analysis the firm virtually drops out—or rather dissolves into habits of thought. Are we forced by the present state of thought to study either technology or the economics of the firm but not both in a comprehensive integrated way? Is technology driving us into "a planned economy, with predominantly collectivistic measures"—which Emil Lederer suggested in the essay on Technology in the Encyclopedia of the Social Sciences as a probable but not necessary outcome of technological developments?

I do not suggest that Mr. Hopkins should have dealt with such questions in this bulletin; rather that it would be helpful to subsequent research in the field if we somehow had the argument on such issues. Stated more generally, the thought has occurred to me that the way the research output of agricultural economics is published may be depriving the craft of much of the help that we could get from those who have done the work. We publish conclusions and findings of fact: these are important for the public generally. But what is fundamentally more important for the profession is *how* we arrive at such conclusions—for the test of truth in economic research must surely be not the correspondence of asserted facts with reality, but whether other competent research workers studying the same problem with the same procedure for the same purpose make the same findings. If this be true then we must be especially clear about the way we handle the various theoretical alternatives: they are our hypotheses and they in turn define the relevancy of the evidence to the problem. This appears to be especially true in a research effort of this sort which does an enormous job with such competence that it may not be repeated for many years to come.

KENNETH H. PARSONS

University of Wisconsin

Technology and Society, S. McKee Rosen and Laura Rosen, New York, The Macmillan Co., 1941. Pp. 474. $3.00.

In "Technology and Society," S. McKee Rosen and Laura Rosen relate social change and technical developments. An introduction by William F. Ogburn on "National Policy and Technology" is followed by a discussion of (1) the technologic base (2) economic effects (3) social effects and (4) political effects.

An impressive inventory of technologic developments and new processes is outlined in the first section, which describes the technologic bases for manufacture, transportation and communication, agriculture, construction, science and, in the professions. One conclusion from this picture of the multitude of new techniques is that society requires of its members increasing specialization of skills and aptitudes and a highly developed division of labor. Economic processes are exceedingly complex and society is not a simple order.

The economic effects of all of these technological developments on the industrialist, the laborer, and the farmer are stated very

briefly. Improved machines and the use of power result in an increasing concentration of productive resources, wealth, and control over the production processes. The authors stress the importance of management in operating a highly developed industrial organization. With greater dependence upon machines and investments in machines, the problem of obsolescence becomes one of the major considerations of the industrial manager.

Highly specialized effort and constantly changing techniques render the position of the laborer insecure, even as the increased use of power and equipment in production raises his output. Technological unemployment appears when the increase in the total production from progressive technological improvements does not bring with it a proportionate increase in employment. Therefore, unemployment can be avoided only when the volume of production is increased at a rate faster than the increase in the labor supply. The solution is to increase total production so as to absorb that unemployment which results from declining labor requirements and an increase in the number of workers. Labor organizations have been effective in increasing wages of those employed, but the labor organizations themselves come under the influence of technological developments. As a result, the authors find a craft organization less effective than it was in former years and suggest that the industrial type of labor organization is needed to give laborers the bargaining power they desire.

From the agriculturalist's standpoint, the discussion of economic effects of technology on the farmer is all too brief. The discussion primarily centers around the influence of tractors and trucks on agricultural production.

The social effects of technological developments are summarized in chapters discussing the development of urban communities and social disorganization, the family, the comforts of life, public resistance, and human welfare. With improvements in transportation, construction, heating and sanitation, the inducement to concentrate population has been such that cities have outgrown the public institutions and customs by which individuals still live. Electric power lines and the automobile, by extending the margins of urban areas, have intensified old problems and brought new ones. The immediate influences on the family as an economic or social institution grow out of the insecurity of income, which is associated with technological developments and industrial organization.

The political consequences of technical developments are summarized as these developments bring new problems to governments. The concentration of population in cities has given rise to problems of traffic, disposal of waste, and public health. Obviously, the undirected rapid growth of cities has led to impossible situations and, as a result of the growing size of these communities, city planning has become a necessary addition to the operation of any municipal government.

The concentration of population in cities and facilities for communication between different parts of the United States has intensified the importance of both city and federal government. Moreover, the concentration of wealth and power has developed an industrial system which transcends powers of local regulation and taxation. The increased power of the federal system, then, both as to the collection of taxes and the administration of aid to states or individuals within states, becomes a natural development from technological progress. Just as the economic commonwealth has expanded beyond state boundary lines, a need has developed for a broad source of taxation and regulation in industry and regulation of labor. Social security thus becomes a national rather than a local problem.

The agricultural economist will find in "Technology and Society" a general setting for the influence on society of improved processes in industry and agriculture. The authors offer many suggestions and explanations of a wide range of phenomena affecting agricultural problems. But the agricultural specialist will feel that the chapters on agriculture are inadequate to offer a solution of the specific problems presented to agriculture by an upsurge in technological developments. The increase in productive capacity on farms and the capacity of consumers to utilize this production has initiated a series of agricultural institutions designed partly to restrict production, partly to carry over the products from periods of deficiency, and partly to effect a new means of distributing these products to consumers. Neither these problems nor the problem of maintaining agricultural income and the need for some assistance to the farmer in his effort to keep his income equal to his outgo, have been touched upon. Moreover, the consequences of increasing sizes of farms, increasing specialization of production, and the fact that technological developments result in benefits to producers not equally distributed by areas in the United States, lead to problems regarding the influence of technology on rural life itself

which are merely suggested but are not discussed within the covers of this book.

R. S. KIFER

Bureau of Agricultural Economics

The Theory of Econometrics, Harold T. Davis. Bloomington, Ill., The Principia Press, Inc., 1941. Pp. 482. $4.00.

"The principal difference between an exact science and an inexact one," says Professor Davis in the preface to this work, "is that the former has defined and measured its variables and has ascertained certain fundamental relationships between them. Thus it may be seen that the evolution of a science from its initial imperfections requires years of patient assembling of data; it forces the invention of new mathematical methods for their interpretation; its creators must pass through many struggles to define the most useful variables and to discover their interrelationships.

"This has been the stony path followed by all high scientific achievement, and it must also be the path that is finally taken by disciplines known collectively as the social sciences. Economics is one of these, and during the past half century it has been evolving slowly into an exact science."

The conscious development of a special discipline growing out of the ideals reflected in these sentences may be said to have dated from the organization, a little over a decade ago, of the Econometric Society, established "to promote studies that aim at the unification of the theoretical-quantitative and the empirical-quantitative approach to economic problems and that are penetrated by constructive and rigorous thinking similar to that which has come to dominate in the natural sciences."[1] Advancement of studies fitting this characterization has been carried on partly by economists who happened to have the requisite mathematical attainments, or who acquired them for the purpose, and partly, and to an increasing extent, by mathematicians who have found in this field attractive opportunity for applying their talents and training.

The author of the work under review is a versatile mathematician of varied interests and broad scholarship who was early attracted to the field of econometrics. In pursuing this interest, he has had the advantage of serving for many years as a part-time member of the staff of the Cowles Commission for Research in Economics.

[1] From Section I of the Constitution of the Econometric Society.

While many who have contributed to the development of econometrics are to be regarded as primarily economists, statisticians, or mathematicians, Professor Davis has become one of a small group who may reasonably claim to be first of all econometricians. Although his *Theory of Econometrics* does not profess to reflect the full breadth of econometrics as he conceives it, and reflects even less the depth of the subject, it deserves to be regarded as an authoritative outline of the theoretical section of the field.

Written as a text, the book assumes facility in the use of mathematics through at least the integral calculus, but appears usable by students who have had no previous formal training in economics. It seems particularly appropriate as a text for an undergraduate course supplementing the general introductory course in economics for students who are specializing in mathematics or who for some other reason have mastered mathematics through the calculus. Although the students who would be served by such a course are relatively few in numbers in most institutions, they are so imperfectly served by the courses usually offered in economics and statistics as to deserve some special consideration.

For such students, this text seems admirably planned and executed. Ideas and reasoning which can be expressed more readily and precisely in mathematics than in English are stated mathematically. Many examples and problems adapted to developing the student's facility in treatment in mathematical terms of the ideas under discussion are supplied in abundance. The discussion of each main topic gives some indication of the historical development of thought on the subject; and ample bibliographies, of which one is appended to each chapter except the first, give a broad sampling of the literature. The style is lively and the text is rich with stimulating comments and suggestions.

The book is also to be commended as optional collateral reading in a wide range of courses in economics. The occasional student in such courses who could use it to advantage would have stimulating vistas of knowledge opened to him. As a text for graduate and advanced undergraduate courses intended to give an introduction to mathematical economics, the book seems less thorough and critical on the economic side than might be wished; but in such a course it must be recognized that students who are having difficulty with mathematics involved need to have the economics kept fairly easy. A competent instructor can more readily supply the

corrective for a text that is too elementary in its economics than for one that is too difficult.

The economist who has little facility in use of mathematics and who turns to this work to learn more of the content and of the contributions of econometrics can readily scan it for a general view of the subject matter, but he will gain little more. There is no attempt here to restate in English arguments and conclusions developed mathematically. The economist or the serious student of economics who undertakes a study of this book with a view to developing facility in following mathematical exposition and analysis may find it well suited to his purpose. He will find in its use some such advantage as the student of a foreign language finds in reading a translation in that language of a work he knows well in his own tongue.

The principal criticism I find to make of this work as a text is that a student of mathematics turning to it for his economics would find no adequate intimation of the existence and importance of that great body of economic thought and knowledge which has not lent itself to mathematical formulation. It is well to stress the importance, for a science, of measurement of its subject matter, as Professor Davis does; and a mathematician discussing the areas of economics which have been subjected to more or less satisfactory measurement may be pardoned for giving principal attention to those parts that involve mathematical concepts and reasoning; but it would not be out of place in a text of this sort to warn the student that it omits large and important areas of economics, and to give some attention to the conditions that make it difficult, and in some areas probably impossible, to develop economics as an exact science.

HOLBROOK WORKING

Stanford University

Planning for America, George B. Galloway and associates. New York: Henry Holt and Company, 1941. Pp. xi, 713. $3.00 (trade edition $4.00).

The thirty-three chapters of this book are arranged into seven parts under the following heads: Introduction, Resources Planning, Economic Planning, Social Planning, Area Planning, Defense Planning, and Conclusions. These heads give a general indication of its scope. The first and last parts, each consisting of three chapters, are

by Mr. Galloway while each of the other twenty-seven chapters is under a different authorship. The editor indicates that "each contributor was given a common outline covering the essential aspects of planning in his field" and also that thirteen assumptions (stated in the preface) were supplied by him. A reasonable degree of uniformity of approach has resulted although differences in methods of attack and in the philosophies of the writers naturally are still in evidence.

This volume serves mainly as a convenient reference on planning activities in various fields. It is less adequate as a satisfactory analytical treatment of the fundamental problems involved in planning. The introductory part, which is the place where one might well expect to find a satisfactory presentation of fundamentals, leaves something to be desired. In some respects, various later chapters, as for instance the one on International Economic Relations by Ernest Minor Patterson, and, to some extent, the one on Recreational Planning by Eduard C. Lindeman, perform this more effectively.

The introductory chapters by the editor suffer from a tendency towards sweeping statements. Thus, it is remarked that "As regards income planning, there have been attempts to raise workers' incomes through minimum wages, public works, and relief, but these have narrowed profit margins and have been offset by price increases" (pp. 46–47). The reader is left in the dark as to how relief and public works reduce profits and how they are offset by price increases if they do. It is a little difficult to comprehend how minimum wages can narrow profit margins if they are offset by price increases. The author refers to "the muddled economics of the New Deal" and finds an explanation in "the lamentable and divided state of contemporary economic thought." He adds the broadside that "Orthodox economic theory is sterile and unscientific, being largely an apology for contemporary institutions in the capitalist countries" (pp. 48–49). One wonders "upon what meat doth this our Caesar feed." If economics is in such a hopeless state why did the editor include chapters by economists and why have economists been assigned such prominent places in governmental programs? He sorts people by occupational groups into certain convenient classifications of thinking. One difficulty with such classifying is that the subjects often dissent.

The approaches employed by the various authors differ widely. A number of them have professional connections with planning activities which not unnaturally may influence their points of view. On the whole, the hopes and promises of planning receive somewhat more attention than the problems and difficulties, which probably is to be expected at this stage of development.

There is much to commend in the volume but at the same time many readers will find not a few things to which they will take exception. This is not to be deplored in a field involving such controversial issues as that of planning. However, it does mean that this is a volume which calls for discriminating reading rather than unthinking acceptance.

O. B. JESNESS

University of Minnesota

Agricultural Planning, Its Economic and Social Aspects, Carl F. Kraenzel and O. A. Parsons. Montana Agricultural Experiment Station Bulletin No. 391, June 1941. Pp. 43

This bulletin is divided into three major parts. The first part, "The Development, Basis and Objectives of Planning," is a most excellent discussion of the points set forth in the title of that section. The authors stress the value of agricultural planning as a means of establishing policies and developing action programs through democratic processes. The second part, "General Economic and Social Factors," discusses twenty-five factors involved in agricultural planning, ranging from lack of water on the farm to tariffs and international trade. The third part, "Economic and Sociological Data Necessary for Planning Activities," is concerned with discussion of six specific types of data considered necessary for planning. In addition to the three major parts of the study, the authors present a list of publications classified as references for various phases of planning.

The reader is impressed with the inadequacy of the data considered necessary for planning activities, particularly in the light of the problems discussed. The data are probably adequate for planning the individual farm but are not adequate for planning the community, county or any larger area, an objective of agricultural planning stressed by the authors.

The principal criticism to be made is in regard to the lack of

consideration of the land as an important element in agricultural planning. It would appear that, in Montana and the Great Plains generally, data on tax delinquency, land ownership, land use and soils should be near the top of the list of information needed. Ownership, control, and use of land will affect the possibilities of enlarging small farms and of improving leasing systems. Large blocks of publicly owned land may make possible the organization of community grazing districts which will aid in solving the problem of insufficient livestock.

Lastly, the land is important as an element in agricultural planning in Montana and the Great Plains because public land management, particularly of county land, is now a major problem. Large acreages of county owned land are common to many counties in the Great Plains. Such land has practically no management for extended periods of delinquency, tax action, and redemption. The problem of county land management is one requiring formulation of policies and, in some cases, of new legislation. It is a phase of the agricultural problem that local planners should be considering.

ROY E. HUFFMAN

Farm Security Administration

Farm Accounting, Donald R. Mitchell, New York, McGraw-Hill Book Company, 1941. Pp. 227, $2.50

"Farm accounting is of value only as it furnishes information helpful to management," is one of the statements in this book with which we can all agree. Most farmers would raise a question about the amount of help they might get from Professor Mitchell's conventional double-entry accounting system with its books of original entry, and its ledgers for posting journal entries.

Some hint of the difficulties in applying commercial accounting techniques to a biological industry can be found on page 99. An attempt is made to "remove the 'mixed' or revenue element from asset accounts." The fact that a young dairy cow becomes more valuable at the same time that she is producing milk presents a bothersome problem to the accountant who has a carefully prepared plan of accounting for a machine that wears out and is clearly distinguishable from the product.

The operator of a 200-acre dairy farm doesn't need a special journal and a ledger containing the thirty-five or forty accounts

suggested on page 160. In fact, the analysis of these accounts would not reveal much useful information to him. No provision has been made for keeping the most pertinent information. If he is considering the purchase of a combine, he will need some basis for comparing the probable cost of harvesting his grain with a combine as compared with using the old binder another year. His journal and his forty ledger accounts would reveal little information bearing on this question that his neighbor, who keeps accounts on the barn door, would lack. Or, if the remodelling of his barn and the enlargement of his herd is a possibility, the involved accounting system tells him but little about what he can expect. In fact, if he has followed directions, he has recorded his milk sales several times (page 26), but has made no record of the butterfat content, deductions for hauling, deductions for supplies, differentials in price, and other pertinent information that would be helpful in estimating the effect of a change in the size of his herd, the breed of his cows, or his method of delivering milk.

A purchase of a team of horses is recorded four times (page 28), but neither the weight nor the age of the horses is included in the sample entry.

Many farmers are anxious to get help in keeping the kinds of farm records that will help them to operate their farm businesses. Evidence of this is found in the large number of inquiries received by workers in this field and by the farmers who are paying annual fees for help in keeping and analyzing their farm records. Such men will find little of value to them in Professor Mitchell's book.

PAUL WILLIAMSON

Cornell University

Wheat in the Post-Surplus Period, 1900–09, with Recent Analogies and Contrasts, Helen C. Farnsworth, Food Research Institute, Stanford University, 1941. Pp. 221–260, 75 cents.

The title of this monograph by Miss Farnsworth is indicative of its contents. It is a report on a study into a limited phase of the economic history of the wheat industry, and it is to be considered, according to the author, "not alone but in its relation to earlier *Wheat Studies* (Stanford) based on similar historical material."

The author has done a thorough piece of research on wheat

price-supply conditions for the first decade of the twentieth century. Her finding that the burdensome surplus of wheat between 1929 and 1935 was due to a decline in the per capita consumption of wheat together with an increasing production will do a great deal to whet the ego of the "cracker barrel" economists who have rendered offhand conclusions of the same general character for a number of years. The attention given to the problem of wheat consumption and consumption trends is commendable. A discussion of the effect on the consumption of wheat of changing dietary habits occasioned by modern living conditions and of the wider availability of new types of food products would have been of interest had the author found a place for such an analysis in her report. She recognizes the importance of the existing economic and political conditions that tend to disrupt the normal world demand for wheat by restricting the free flow of international trade. She does not, however, delve directly into the present economic policy of our government which makes the immediate price of wheat contingent on political action rather than economic forces.

The discussion of "Price Tendencies, 1898–1909" is especially well done. A graphic-statistical analysis implements a logical explanation of the wheat price movements for the period in question. Technological innovations in wheat culture and lower unit freight costs were well chosen as examples of factors tending to reduce unit production costs during a period when prices appeared to react to the producers' disadvantage.

This monograph in its entirety is well worth the attention of all students of economic history, and it will be especially helpful to those governmental agencies attempting to find a solution to our existing wheat problem. The conclusions of the author are based on a thorough study and they will be valuable to the general public.

D. B. DELOACH

Oregon State College

The American and His Food, Richard Osborn Cummings. Chicago: The University of Chicago Press. 1940. Pp. xi, 267. $2.50.

The last several decades have seen great expansion in our knowledge of nutrition and dietary needs, and in our information regard-

ing the nutritional adequacy of the actual diets of many important groups in the population. Depression not only made us aware of the great number of people who were unable to buy enough food—and the consequent dislocation in agriculture because of failure of demand—but also aroused us to undertake positive social policy to alleviate this situation. War and the defense program have heightened our consciousness of the seriousness of malnutrition—its social cost in terms of loss not only of military strength but also of industrial labor power. Simultaneously some previous farm surpluses have been turned into shortages, and a reexamination of the whole structure of our food economy and of social policy regarding it is in progress.

A history of food consumption in the United States is therefore timely. It can supply much-needed perspective in our approach to current problems. The economist, in particular, would like it to include discussion of a number of topics: Food consumption in relation to changing scales and standards of living; the impact of geographic expansion upon patterns of food consumption; the development of nutritional science and its influence upon eating habits; the revolution in the production and distribution of food as a result of the rapid technological development of our society; the evolution of social concern over malnutrition into social policy to deal with it. He will be especially interested in information regarding food problems and food administration during previous war periods and their possible implications for the present.

All of these things are touched upon in Professor Cummings' book, *The American and His Food*, informatively and, especially in the earlier chapters, often interestingly. The volume is perhaps somewhat more slender than would be expected from its subtitle: "A History of Food Habits in the United States"; but it is essentially a descriptive survey and in no sense attempts to be an analytical treatise. The organization is therefore basically chronological rather than topical, with subdivision on the basis of social location—rural as versus urban consumption, and high-income as versus low-income.

This is as it should be in a semi-popular work prepared by a historian for a nontechnical audience. Any other approach would necessarily involve pointing the work towards particular specialized interests, thus defeating its purpose.

From the point of view of the technical worker, however, the

book has considerable value beyond that of giving a thumb-nail sketch of the development of American food habits. It contains a total of 664 footnote references—an average of 44 per chapter. Even allowing for "*ibid.'s*," and "*op. cit.'s*," this represents a voluminous bibliography from which to select in getting information on topics of special interest.

The value of the book from this standpoint could have been enormously increased, however, by drawing these references together into a topical bibliography. The index hardly suffices for this purpose.

Of particular interest to the economist is the series of appendices containing food budgets, drawn from different periods, for families at different economic levels. In addition to showing low-income families' expenditures for various foods at different times, the food total is compared with the total of all other expenses, and a table is added comparing percentages of total expenditure going for food in different budgets. A minutely detailed table is given of food expenditure of a professional family in 1816–17 and in 1926–27.

There is always danger that superficial conclusions will be drawn from such comparisons. For example, most of the earlier budgets for low-income families were originally published to show the unhappy condition of these families. Even supposing no exaggeration for effect, there is still some likelihood that the budgets were influenced by someone's idea of what poor families ought to eat. One would hardly be justified in taking them at face value as typical of the periods they represent without further careful investigation. But it is always illuminating to compare quantities and prices of foods included in different budget estimates, having due regard for the sources of information.

All in all, Professor Cummings has given an interesting sketch of American food consumption as it has developed from the post-Revolutionary period through the periods of dietary reform, development of transportation and expansion of the frontier, the pure-food movement, and the rise of nutritional science, down through the first World War and in the post-war and recent depression periods. There remains room for a longer, more detailed and more analytical work, covering the same topics but organizing them more systematically and going into them more thoroughly.

HERMAN M. SOUTHWORTH

Bureau of Agricultural Economics

Livestock Marketing, Austin A. Dowell and Knute Bjorka. New York, McGraw-Hill Book Co. 1941. Pp. x+534. $4.00.

We carnivorous Americans will find in this new and attractive book much substance about one of our principal food staples. While it is designed primarily as a college text in a specialized field of marketing, it will undoubtedly be found useful as a standard reference wherever men are engrossed with the problems of livestock marketing.

The scope of this work by the two well-known agricultural economists, Professors Dowell of the University of Minnesota and Bjorka formerly of Iowa State and now with the United States Department of Agriculture, is broader than the title suggests. After perfunctorily explaining the nature and services of marketing in the first chapter, they circumscribe the sources and location of supplies, point out trends in world meat consumption and trace the historical development of the packing industry in this country from Colonial times.

This introduction provides the necessary background for the next chapters describing numerous agencies, market facilities and the various sales outlets both local and terminal. Then they take up certain elemental problems in the handling and care of animals while in transit between farms and feed lots and slaughteries, such as shrinkages, injuries and death losses. At this point the writers delve into the intricacies of grade standards, market returns and reports, price differentials and methods of evaluation such as selling on the basis of guaranteed yields and on carcass grades and weights. In the closing chapters of the book, the reader will find a discussion on cold storage lockers, an excellent statement of wholesale and retail methods of distribution and finally an appraisal of probable future industry developments.

Discerning readers usually discover some minor deficiencies in any text, this one not excepted. The book is practically devoid of theoretical discussion on the fundamental concepts of marketing, and it is characterized by the authors' slavish adherence to detailed documentation of facts supporting all important generalizations and conclusions. Controversial issues are presented by listing meritorious points on both sides of the case, leaving the reader to ponder over which side the authors would take if pressed to a decision. It is hoped that in a later edition of this book there will

be included some treatment of marketing wool, hides and by-products of the packing industry. Interesting chapters might be written on problems of financing livestock production and sales and international competition in the distribution of livestock and meat products. The book could be made generally more accessible as a reference source by expanding the index.

In the opinion of this reviewer, Dowell and Bjorka are to be commended for their industry and painstaking research in producing this publication. It is a methodical, well-written, unbiased book on the marketing of livestock products.

HENRY H. BAKKEN

University of Wisconsin

Economic Trends in Livestock Marketing, Sam H. Thompson, Ames, Iowa. Printed privately by the author, 1940. Pp. 174, $2.50.

This study merits the critical attention of students of livestock marketing. It analyzes the marketing problem of livestock producers in terms of the practical questions confronting them and of the means and processes required in the finding of suitable answers. Students will find in this study something quite different from the usual descriptive and categorical reports and bulletins on the subject. While the author finds cooperative marketing a fertile and productive means of improvement of marketing by producers of livestock, he leaves no ground for the reader to suppose it to be a ready-made sort of solution that can be applied by a simple and casual installation. The long and intimate association of the author with the changing scene of the livestock trade in the region of heaviest and most specialized production has given him ample perspective for discerning views of the position of producers in the trade and of ways and means of improvement of their situation. A less seasoned student and observer might have suffered severe disillusionment from the waxing and waning of marketing enterprise among producers. But, in this study the author has used to good advantage the record of sucess and failure in this branch of farm business for the clarification of its purpose, means, and methods.

The study is a resume, a panorama, of change during the last twenty-five years in the livestock trade, particularly in Iowa, and

a record of efforts by producers to improve their market relations. It reviews the effects of rapid technological developments upon the location and character of trading centers, methods of trading, and the general character of the market. It is well documented and assembles many significant data. While on the whole the treatment of the subject is sketchy and in parts little more than a topical outline, its organization is clear and it is sufficiently developed to make the study a valuable reference for specialists and students.

PAUL L. MILLER

Division of Marketing

Drainage District Organization and Finance 1879–1937, Illinios Tax Commission in cooperation with Work Projects Administration. Survey of Local Finance in Illinois, Volume 7, Chicago, Ill, Illinois Tax Commission, 1941. Pp. 213.

The study on *Drainage District Organization and Finance* is the seventh in a series entitled "Survey of Local Finance in Illinois" prepared by the Illinois Tax Commission.

In undertaking this study the Commission attempted a task which had been started several times before but only partially completed because of its magnitude. Maps were prepared and financial statistics compiled on 1541 drainage districts. These districts are quasi-governmental units which are not required to report to any central agency, and there is no provision in the state statute for a uniform recording of the formation of such units.

Almost one-third of the drainage district bonds outstanding in 1937 were in default. The study reveals that many of these districts cannot hope to support the present system of levees and drainage facilities from their present collection of drainage assessments. The costs of drainage for these lands is in excess of their earning power in agricultural productivity. Because of financial distress necessary repairs have long been neglected. The previous financial history makes it very difficult to finance a new undertaking. The Federal Government, through several different agencies, has extended engineering construction, and financial aid to many of the districts. For many years the State of Illinois has made an annual appropriation for control of the Illinois River and the Division of Waterways has extended help to many of the drainage districts along this river.

Attention is given to the way in which drainage district organization developed and the procedure for organizing, financing, and operating the districts under the existing laws. Present laws regulating drainage district organization have developed over a period of time through the successive efforts of those interested in developing agricultural land and in providing land drainage or flood protection. In the absence of many statutory provisions for land drainage the early rights of individual owners were determined by common law. Efforts to secure collective and cooperative action for drainage from early times to 1879 developed along three lines: Formation of private chartered drainage and navigation companies procedure under the Swamp Law Act of 1850, and activities of existing governmental units in providing land drainage and flood protection. These early efforts culminated in the passage of two drainage laws which are in effect today—the Drainage Act of 1879 and the Farm Drainage Act of 1885. These statutes have been the subject of many court decisions in the last sixty years with the result that much of the present drainage district law is outside the statute books.

The report points out the need for further study in the field of agricultural law, and the need for a single simplified drainage law to supersede the existing acts and embody the substance of the numerous court decisions. Much of the material in the report can be used as the basis for further study to get at some of the economic aspects of agricultural production which involve such factors as intensity of land use, comparative crop yields, and other technical problems affected by the formation of drainage districts.

JOSEPH ACKERMAN

Farm Foundation

NEWS ITEMS

Upon the suggestion of the sub-committee on Farm Management (Sherman Johnson, Stanley Warren, and W. W. Wilcox, chairman) of the Social Sciences Research council, two Farm Management Statistical Clinics were held recently:

(1) The departments of Experimental Statistics, Rural Sociology, and Agricultural Economics at North Carolina State College arranged a regional conference of workers in the field of Agricultural Economics and Rural Sociology, which was held June 23 to 27, 1941. The theme of this conference was *Analysis and Interpretation of Social and Economic Data.* The objectives of the conference were: (1) To give research workers in agricultural economics and rural sociology an opportunity to consult with competent mathematical and theoretical statisticians on the statistical aspects of their research work; (2) To provide a forum for the exchange of ideas and methods of statistical analysis being used on research projects now under way. Approximately sixty people from thirteen states and the United States Department of Agriculture attended and participated in the conference. Most of the papers were presented in an informal manner, and were followed by a large amount of discussion from the floor in which most of the members of the conference participated. The following is the list of the papers presented:

I. *Construction and Use of Scales:* Problems encountered in the development of socio-economic status scale—W. H. Sewell. The application of scales in levels of living studies—David Ross Jenkins. II. *Agricultural Prices:* An Application of sampling technique to enumeration—Paul G. Homeyer. Methods used in analyzing tobacco prices—S. L. Clement. Methods used in the construction of Florida farm price index numbers—A. H. Spurlock. The problem of weighing a state index of prices received by farmers when a seasonal crop contributes a large proportion of the total income—T. L. Stuart. III. *The Theoretical Implications in the Construction and Use of Index Numbers:* Gunnar Lange, O. C. Stine. IV. *Demographic and Regional Analyses:* An examination of the use of factor analysis in the problem of subregional delineation—Margaret Jarman Hagood. School life expectation and marriage expectation: An attempt to apply the techniques of life table construction to other fields of sociology—Rupert B. Vance, Nadia Danilevsky. V. *Theory and Application of Representative Sampling:* Techniques of sampling for a continuous agricultural census—R. E. L. Greene. A problem in sampling—Robert J. Monroe. Sampling studies in agricultural statistics—A. J. King. Acreage sampling in India—Harold Hotelling. VI. *Recent Developments in Farm Management Research Techniques:* G. W. Forster. Incomes of typical family-operated farms by regions—Wylie D. Godsell. VII. *Farm Management Research Techniques:* Some examples of stratification in the analysis of Virginia farm management data—F. L. Underwood, W. L. Gibson, Jr. Techniques and procedures used in studying the problems of low-income farmers—C. R. Sayre, R. B. Hummel, F. D. Cornell. Techniques used in analyzing farm management problems on an area basis—R. E. L. Greene. Area studies in a re-

gional farm-management research program in the South—B. H. Thibodeaux.

(2) The Agricultural Economics Department of the University of Illinois arranged for such a Clinic which met on September 10 and 11, 1941. Some 110 persons attended from 15 state agricultural colleges, several bureaus of the U. S. Department of Agriculture. Thirteen papers or addresses were presented. These papers provided the basis for discussion and dealt with a variety of topics ranging from objectives of research in the field and techniques of analyzing various types of farm records to technical discussions of the problem of sampling, using paired samples, significance of averages and calculation of index numbers in farm management research.

The desirability of expanding farm management research beyond the study of the efficient organization and operation of farms was discussed. The importance of stratifying—in effect classifying—in determining averages so that these measures would be as homogeneously grouped as possible was frequently stressed. The papers presented were:

Objectives of Research in the Farm Management Field—G. A. Pond, University of Minnesota. Techniques of Analyzing Various Types of Farm Records—S. W. Warren, Cornell University. "Budgeting" as a Research Approach in Farm Management—J. I. Falconer, Ohio State University. Methods of Obtaining Representative Samples of Farm Management Data—W. W. Wilcox, and R. J. Jessen, Iowa State College. How to Determine the Size of Sample Needed—A. J. King, Iowa State College. Use and Limitations of the Biased Samples Supplied by Farm Financial Records—K. T. Wright, Michigan State College. Why World-Wide Agricultural Adjustment Must Follow This War—J. Clyde Marquis, Office of Agricultural Foreign Relations, U. S. Department of Agriculture. The Reliability of Averages—E. J. Working, University of Illinois. The Use of Paired Samples—W. D. Goodsell, U. S. Department of Agriculture. Application of Analysis of Variance Technique to Research in Farm Management—E. L. Butz, Purdue University. Random Remarks on Statistical Research—W. Edwards Deming, Bureau of Census, U. S. Department of Commerce. Methods of Calculating Index Numbers from Farm Management Data—S. A. Engene, University of Minnesota. Relationship Between the Productivity of Soil and Farm Earnings—P. E. McNall, University of Wisconsin.

A Farm Management Research Clinic was held at Kansas State College, October 31 and November 1, 1941. Several nearby states joined in the conference and participated on the discussions. A brief survey of the projects and methods used in Farm Management Research in the various states was followed by discussions on sampling techniques and statistical methods appropriate for the enalysis of farm management data by Professor Waite of Minnesota, other statisticians and farm management men.

Ernest Baughman, extension assistant economist, University of Minnesota, has been granted leave to undertake a marketing study for the American Farm Bureau Federation at Chicago.

O. E. Brown has accepted a position as field inspector with the Illinois State Department of Health.

Royal Jay Briggs has joined the staff of South Dakota State College as Assistant Professor in Agricultural Economics, replacing Norris J. Anderson who is on leave of absence. Mr. Briggs was formerly an Instructor at the University of Missouri.

H. H. Cutler, Utah State Agricultural College, has been granted a sabbatical leave of absence for graduate study during the school year at Iowa State College.

A. T. Day, Purdue '25, formerly with the Farm Mortgage Department of the Equitable Life Insurance Society of New York became associated with Wilson & Company, meat packers, in their statistical division.

S. H. DeVault, Head of the Department of Agricultural Economics and Farm Management, University of Maryland, has recently been made a member of the Maryland State Nutrition Committee. He is also Secretary of the State Committee on Farm Labor.

Raymond J. Doll, who has been studying at the University of Minnesota for the past year, returned to his duties on the staff of the Department of Economics and Sociology, Kansas State College, on July 1.

Robert J. Eggert, for the last three years livestock marketing specialist on the staff of the Department of Economics and Sociology, Kansas State College, resigned his position on September 1 to become Assistant Director, Department of Marketing, American Meat Institute, Chicago.

Stephen Enke is teaching at Montana State College for the school year, 1941–42.

G. W. Freemeyer, University of Illinois, is now employed as a statistician with the Milk Market Administration in St. Louis.

Walter B. Garver has resigned as research assistant in Agricultural Economics at the University of Minnesota to accept a position as economist with the Federal Reserve Bank of Chicago.

George H. Goldsborough has resigned his position as Assistant Land Use Planning Specialist for Maryland and has accepted a position in the Office of Personnel, Office of the Secretary, U. S. Department of Agriculture in Washington, D. C. Mr. Goldsborough at present is working primarily on problems connected with the farm labor situation.

Harold G. Halcrow, Montana State College, is on leave of absence, taking graduate work at the University of Chicago on a Farm Foundation fellowship.

Harlow Halvorson has been appointed to the staff in Agricultural Economics at the University of Minnesota.

Clifford Hardin of Purdue has accepted a position as Extension Marketing Specialist at Wisconsin.

Irwin Hedges, who spent the past year taking graduate work at the University of Chicago under a Farm Foundation fellowship has returned to the Agricultural Economics Department at Wisconsin.

E. C. Hedlund of Illinois, is now a Lieutenant in the United States Army.

Eugene J. Hervey has been appointed Economist in Farm Taxation in the Division of Farm and Ranch Economics, A and M College of Texas, during the absence of Mr. H. C. Bradshaw, who is on leave to study at Harvard University.

B. H. Hibbard, formerly of the University of Wisconsin, is visiting professor at Montana State College during the fall and winter quarters, 1941–42.

On October 1, Raymond W. Hoecker joined the staff of the Department of Economics and Sociology at Kansas State College as a marketing specialist.

V. L. Israelsen, University of Wisconsin, has been added to the staff of the Department of Agricultural Economics, Utah State Agricultural College, for the coming year in teaching and research.

F. E. Joehnke, formerly in agricultural economics at the University of Illinois, is now a Lieutenant in the United States Army.

Gerald Korzan, Assistant in Farm Management, South Dakota State College, resigned June 30 to enter Military Service as Second Lieutenant. Virgil Wintrode, will replace him.

G. A. Lee, formerly with the Chicago Milk Marketing Administration, is now employed by the Dairy Marketing Committee of the American Farm Bureau Federation.

James C. Lesar, formerly of Illinois, is now doing economic analysis for the Board of Trade of the city of Chicago.

Since September 1, four agricultural statisticians have joined the staff of the Cotton Division of the Agricultural Marketing Service. They are James H. Bryant, A. and M. College of Texas; Ersel H. Matthews from Texas Technological College; Robert L. Pou of A. and M. College of Texas; and Giles B. Probst, from the University of Tennessee. Mr. Bryant, Mr. Matthews, and Mr. Pou have been assigned to the Dallas office; Mr. Probst to the Atlanta office.

Joe R. Motheral has been appointed Economist in the Division of Farm and Ranch Economics, A. and M. College of Texas to fill a vacancy made by the resignation of Dr. C. Horace Hamilton in 1939. Mr. Motheral will have charge of the research program in land tenure of the Texas Station.

J. Clyde Marquis, Permanent American Delegate to the International Institute of Agriculture at Rome was recalled by the Department of State in May and terminated his war appointment by transfer to the Office of Foreign Agricultural Relations in the Department of Agriculture, on June 30. The Institute is continuing its work with representatives of about 30 countries active and 75 per cent of the staff on duty. While the work is restricted by the difficulties of gathering statistics and other information, the regular publications are being issued as completely as possible. The United States has not withdrawn from the Institute but Congress did not provide for a resident delegate after July 1.

E. J. Niederfrank has returned to the University of Maine to assume his teaching duties after studying for the past year at the University of Wisconsin.

Edmond A. Perregaux has been appointed head of the Department of Agricultural Economics at the University of Connecticut to succeed D. O. Hammerberg.

Hans H. Plambeck, formerly of Cornell University, has been appointed to the staff at Montana State College.

Benjamin D. Raskopf, Assistant Agricultural Economist, University of

Tennessee, has been granted leave of absence to serve as a Reserve Officer in the Army Air Corps. He is stationed at Orlando, Florida.

J. Wayne Reitz who was granted leave of absence in 1939 to pursue graduate work at the University of Wisconsin under a General Education Board fellowship has resumed his position as Professor of Agricultural Economics at the University of Florida.

R. R. Renne, Head of the Department of Agricultural Economics, Montana State College, is on leave of absence, teaching at Cornell during the first semester, 1941–42. Professor O. A. Parsons is acting head of the Department of Agricultural Economics during the absence of Dr. Renne.

Waldo S. Rowan has been appointed Assistant Agricultural Economist, University of Tennessee. In cooperation with the Agricultural Marketing Service he will work on a study of cotton marketing problems in Tennessee.

Carl B. Smith has resigned his position as Extension Farm Management Specialist in the University of Maryland to accept a position with the Farm Security Administration in Denver, Colorado.

Donald J. Street, Assistant Agricultural Economist of the Bureau of Agricultural Economics has been stationed, since July 1, 1941, at the State College of Washington, Pullman, Washington, where he is cooperating in the investigation of the most suitable types of farming for the Columbia Basin Irrigation Project.

L. F. Tammen, University of Illinois, has accepted a position as professional farm manager with Carl Olson of Freeport, Illinois.

R. G. Wheeler of the Division of Farm Management and Costs, U.S.D.A., is at the University of Connecticut working on a study with W. J. Hansen.

Rodney Whitaker, formerly agricultural economist of the Cotton Division of the Agricultural Marketing Service, on May 1, 1941, became a member of the staff of the Commodity Exchange Administration. He is now carrying on his new duties as principal administrative officer, in charge of the Division of Contract Markets and Regulations.

George Wilkens, formerly in the Department of Agricultural Economics at the University of Minnesota is now on the staff of the Federal Reserve Bank of Minneapolis.

The Ratcliffe Hicks School of Agriculture, a two-year school, has been established, and opened this fall at the University of Connecticut. Wilfred B. Young of the University faculty was appointed Director.

Three cotton fiber technologists—Dr. Enoch Karrer, Dr. Carl M. Conrad, and T. L. W. Bailey, Jr.—associated for some years with the Washington fiber laboratories of the Agricultural Marketing Service, transferred July 1 to the Bureau of Agricultural Chemistry and Engineering. The men will take up work at the new Southern Regional Research Laboratory at New Orleans, La. James H. Kettering, a staff member of the cooperating Bureau of Plant Industry and heretofore assigned to the AMS laboratory, also is being transferred to the New Orleans laboratory.

During the recent session of the Texas Legislature a bill providing $250,000 for the establishment of a cotton research laboratory was passed. A Cotton Research Committee composed of the presidents of The Uni-

versity of Texas, Texas Technological College, and the A. and M. College of Texas is made responsible for the administration of the laboratory.

* * *

The forty papers presented at the First Cotton Research Congress, held at Waco, Texas, June 27 to 29, 1940, have been published in a volume of 339 pages, paper bound, which may be obtained from L. P. Gabbard, College Station, Texas, at fifty cents a copy, postpaid.

* * *

Industrial Specialists May Still Apply for Government Jobs

The Government continues its search for specialists in all branches of industry and business. The Federal Civil Service examination for Industrial Specialist, announced on July 7, has been amended to remain open for receipt of applications until further notice.

The National Defense Program needs men with experience in one or more of the following fields:

Iron and steel, Non-ferrous metals, Machine tools, Ordnance, Aircraft, marine and automotive equipment, Railroad repair shops, Radio and other electrical equipment, supplies and apparatus, Textiles, Forest products, Paper, Printing and publishing, Chemicals and allied products, Plastics, Petroleum and coal products, Rubber products, Stone, clay and glass products, Leather and its manufactures, Food and kindred products. Salaries range from $2,600 to $5,600 in the various grades. No written examination is given. Application forms may be obtained from Civil Service Representatives at any first- or second-class post office or at a Civil Service District Office.

LEWIS F. GAREY
1886–1941

Lewis F. Garey, Professor of Rural Economics, University of Nebraska, passed away at his home July 24. He had been in failing health for about 16 months, but continued his work until only a few weeks before his death.

Dr. Garey was essentially a Nebraska product. He was reared on a Furnas county farm and received the major part of his education in Nebraska institutions. He graduated from Peru State Normal College in 1910 and from the College of Agriculture of the University of Nebraska in 1914. He received the degree Master of Arts from Nebraska in 1915, and his Ph.D. from Cornell in 1931.

Dr. Garey taught at Madison and Valley, 1912–14; was a supervisor in the Teachers College High School, of the University, 1912–15; an instructor at Peru Normal College, 1915–17; Assistant Professor at Colorado State College, 1917–19; State Supervisor of Agricultural Education in Colorado, 1919–20; and a member of the Department of Agricultural Economics, University of Minnesota, 1920–35. He returned to the University of Nebraska September, 1935.

Dr. Garey was a teacher in the full meaning which the word implies. Students from every institution where he taught—high school, normal school, and university—testify to his effective work in the schoolroom. Because he thought everything through so clearly, he was able to give an unusually clear cut presentation. A professor from one of the Missouri State Normals told a group of fellow graduate students at the University of Minnesota that in forty years as student and teacher Dr. Garey was the best instructor he had ever heard in a classroom.

In later years the major part of Dr. Garey's time was given to economic research. He was the author of a laboratory manual in farm management, about a dozen experiment station publications, and nearly 100 articles published in national magazines and papers.

Dr. Garey was interested in many activities. He enjoyed music and sang for three years in a quartette; he pitched winning ball for the Beaver City High School, Peru State Normal, and Nebraska City, and was tried out by the St. Louis Browns; he was a member of the Board of Deacons of the Plymouth Congregational Church;

he was an active member of many committees on the College of Agriculture campus. He was a Mason, a member of the Grange, of the American Farm Economic Association, and of the honor societies Alpha Zeta and Gamma Sigma Delta. He kept a firm grip on the practical problems of Nebraska agriculture by buying a farm in Furnas county and taking an active part in its management.

Dr. Garey had the happy faculty of always getting the job done. He knew how to concentrate and utilize his time and talents to the fullest extent.

The good friend and loyal co-worker is gone but the influence of his research and teaching remains and will not end with the passing of those who knew him best.

H. C. F.

PRELIMINARY PROGRAM FOR THE THIRTY-SECOND ANNUAL MEETING OF THE AMERICAN FARM ECONOMIC ASSOCIATION*

HOTEL COMMODORE, NEW YORK CITY
DECEMBER 27, 28, 29, 30, 1941

Saturday, December 27

Saturday Morning

10:00 A.M.

1. Changing Inter-Regional Relationships and the Adjustment of Farm Management Programs to Them
   Chairman: F. F. Hill, Cornell University
   Paper: Regional Changes in Farming During the Past Ten Years and Some Probable Future Trends
   R. L. Mighell and associates in the Bureau of Agricultural Economics
   Discussion: Walter W. Wilcox, Iowa State College
   J. A. Hodges, Kansas State College
   L. C. Cunningham, Cornell University

2. The Content of Land Economics and Research Methods Adapted to Its Needs
   Chairman: George S. Wehrwein, University of Wisconsin
   Paper: Leonard Salter, University of Wisconsin
   Discussion: R. R. Renne, Montana State College
   Conrad Hammar, University of Missouri
   Harry C. Woodworth, University of New Hampshire
   Harry Steele, Bureau of Agricultural Economics
   Rapporteur: B. M. Gile, University of Louisiana

3. Food Markets and Price Control Under the Defense Program
   (Joint session of the American Farm Economic Association and the American Marketing Association)
   Chairman: Gordon C. Corbaley, American Inc. Institute of Food Distribution
   Papers: Factors in the Current Expansion of the Demand for Food
   Henry E. Erdman, University of California
   Cooperative Advertising and the Expansion of Demand for Food
   J. W. Millard, Arthur Kudner, Inc.
   Some Problems in the Control of Food Prices
   E. J. Working, University of Illinois
   Discussion: H. B. Price, University of Kentucky
   R. S. Vaile, University of Minnesota

---

* Wording of topics tentative for some sessions.

Saturday Afternoon

2:00 P.M.—AGRICULTURAL PROGRAMS FOR DEFENSE AND THE POST WAR

Chairman: O. B. Jesness, University of Minnesota
Papers: Adapting Agricultural Programs to Defense Needs
Sherman E. Johnson, Bureau of Agricultural Economics
Agricultural Programs for the Post-war Period
E. C. Young, Purdue University
Discussion: R. R. Renne, Montana State College
G. H. Aull, Clemson College
H. R. Tolley, Bureau of Agricultural Economics
Don Anderson, University of Wisconsin

4:30 P.M.—ANNUAL MEETING—EDITORIAL COUNCIL

Saturday Evening

8:00 P.M.

1. The Recruiting and Training of Personnel in the Rural Social Sciences
(Panel session arranged by the Committee on Recruiting and Training of Personnel)
Chairman: Asher Hobson, University of Wisconsin
Panel members: C. O. Brannen, University of Arkansas
W. E. Grimes, Kansas State College
J. S. Hathcock, U. S. Civil Service Commission
F. F. Lininger, Pennsylvania State College
Theodore Schultz, Iowa State College
E. C. Young, Purdue University
F. V. Waugh, Agricultural Marketing Service
2. Agriculture in the Last War
(Joint session of the American Farm Economic Association and the Agricultural History Society)
Chairman: O. C. Stine, Bureau of Agricultural Economics
Papers: The Course of Agricultural Prices in World War I—A comparison with the current situation
J. M. Tinley, University of California
The Land Market and Farm Mortgage Debts, 1917–1921
L. J. Norton, University of Illinois
The Farm Labor Situation, 1917–1921
Harry Schwartz, Columbia University
3. Bases for the Establishment of Prices under the Defense Program
(Joint session, American Farm Economic Association and American Statistical Association)
Chairman: F. C. Mills, Columbia University
Papers: Criteria for the Establishment of Price Ceilings on Agricultural Products
Warren C. Waite, University of Minnesota
The Mechanics of Price Control for Nonagricultural Products
Donald H. Wallace, Office of Price Administration

Discussion: L. H. Bean, Bureau of Agricultural Economics
Sidney Hoos, Commodity Credit Corporation,
Clayton Gehman, Division of Research and Statistics,
Federal Reserve Board

Sunday, December 28

8:00 A.M.—GROUP BREAKFASTS

California, Harold F. Breimeyer in charge
Cornell, C. M. Bond in charge
Illinois, G. L. Jordan in charge
Minnesota-Harvard, George B. Clarke in charge
Wisconsin, Virgil I. Hurlbut in charge

10:30 A.M.—ANNUAL BUSINESS MEETING

Sunday Afternoon

2:00 P.M.—COMMITTEE SESSIONS

1. Executive Committee, American Farm Economic Association
2. Committee on Recruiting and Training of Personnel
   Chairman—W. E. Grimes, Kansas State College
3. Committee on Research in Farm Management
   Chairman—Walter W. Wilcox, Iowa State College
4. Conference on the Problems of Graduate Students in the Rural Social Sciences
   Chairman—Ivan R. Bierly, Cornell University
   Counselor—B. H. Hibbard
   Committee: Ivan R. Bierly, Cornell University
   Ernest Heiby, Ohio State University
   Roland G. Nelson, Pennsylvania State College
   R. S. Bylin, University of California
   Philip M. Raup, University of Wisconsin
   Elmo Jackson, Harvard University
   A. H. Harrington, University of Illinois
   Byron R. Bookhout, Purdue University
5. Conference on the Teaching of Agricultural Prices
   Chairman—W. P. Mortenson

(If other groups wish to hold minor sessions during this period arrangements can be made by communicating with president of the Association.)

4:00–7:00 P.M.—SMOKER AND GET-ACQUAINTED SESSION

Columbia University Club, 4 West 43rd Street
O. S. Morgan, Columbia University, in charge

Sunday Evening

8:00 P.M.—LOOKING TO THE POST-DEFENSE SITUATION. (INTERNATIONAL ASPECTS)

Chairman: E. G. Nourse, Brookings Institution

Papers: The World Market for Agricultural Products
J. B. Condliffe, University of California

Post-Defense Problems in Canada-United States Trade Relationships
(Speaker to be selected)

Problems of South America-United States Trade as Viewed from South America
(Speaker to be selected)

Monday, December 29

Monday Morning

10:00 A.M.—THE SCHISM IN AGRICULTURAL POLICY

(Joint session of the American Economic Association and American Farm Economic Association)

Chairman:

Papers: Agriculture Policy Approached from the Standpoint of Human Welfare
Mordecai Ezekiel, United States Department of Agriculture

Agriculture as a Commercial Industry Comparable to Other Branches of the Economy
M. R. Benedict, University of California

The View of the General Economist
John B. Canning, Stanford University

Discussion: Theodore W. Schultz, Iowa State College

12:30 P.M.—JOINT LUNCHEON, AMERICAN FARM ECONOMIC ASSOCIATION AND RURAL SOCIOLOGICAL SOCIETY

Chairman: T. Lynn Smith, Louisiana State University

Paper: Toward a More Adequate Approach to the Farm Tenure Problem
Karl Brandt, Stanford University

Monday Afternoon

2:00 P.M.

1. The Problem of Old-Age Security for Farm Workers

Chairman: W. T. Ham, United States Department of Agriculture

Papers: J. J. Corson, Bureau of Old-Age and Survivors Insurance, Social Security Board
E. L. Warren, Wage and Hour Division, U. S. Dept. of Labor

Discussion: W. G. Murray, Iowa State College
Henry Fowler, Formerly Chief Counsel for the La Follette Committee
W. R. Ogg, American Farm Bureau Federation
Glenn J. Talbott, Farmers Educational and Cooperative Union
Rapporteur: O. E. Mulliken, United States Department of Agriculture

2. The Collection of Basic Data on Agriculture
Chairman—C. F. Sarle, The U. S. Weather Bureau
Paper: The Problems of Adequacy and Coordination in the Collection of Agricultural Data
O. A. Negaard, Division of Statistical Standards, Bureau of the Budget
Discussion: Glen Simpson, Agricultural Marketing Service
Warder B. Jenkins, Bureau of the Census
Walter H. Ebling, Federal-State Crop Reporting Service, Wisconsin
Charles L. Stewart, University of Illinois

3. The Economics of Conservation
Chairman: M. M. Kelso, Bureau of Agricultural Economics
Papers: Private Enterprise and Conservation
S. v. Ciriacy-Wantrup, University of California
Society and Conservation
Conrad H. Hammar, University of Missouri
Public Policy and Action for Conservation
A. C. Bunce, Iowa State College

Monday Evening

8:00 P.M.

1. Public Controls in the Marketing of Fluid Milk
Chairman: Leland Spencer, Cornell University
Papers: Important Considerations in Determining Fair Prices for Fluid Milk
Alan MacLeod, New England Research Council
The Effect of Milk Control Programs on Cooperatives
C. G. McBride, Ohio State University
Some Economic Problems Encountered in Milk Control Administration
N. J. Cladakis, Market Administrator, Metropolitan Milk Marketing Area, New York
A. J. Pollard, Statistician, Office of Market Administrator, New York
Rapporteur: M. C. Bond, Cornell University

2. Toward a More Adequate Approach to the Farm Tenure Problem. Panel discussion based on the paper by Karl Brandt
(Joint session, American Farm Economic Association and Rural Sociological Society)
Chairman—H. C. M. Case, University of Illinois
Panel members: Karl Brandt, Stanford University
Harold Hoffsommer, University of Louisiana
Charles S. Johnson, Fisk University
Joseph Ackerman, The Farm Foundation
Rainer Schickele, Iowa State College
E. D. Tetreau, University of Arizona
Rapporteur: James H. Marshall, Bureau of Agricultural Economics

3. Evaluation of Soil Conservation Investments for Farm Management Purposes
Chairman: John A. Hopkins, Iowa State College
Papers: Problems in Physical Evaluation
George W. Collier, Soil Conservation Service
Problems in Economic Evaluation
Neil W. Johnson, Bureau of Agricultural Economics
Discussion: H. C. M. Case, University of Illinois
H. C. Taylor, The Farm Foundation
L. Jay Atkinson, University of Connecticut
G. W. Forster, North Carolina State College

Tuesday, December 30

Tuesday Morning

9:30 A.M.—LOOKING TO THE POST-DEFENSE SITUATION (DOMESTIC ASPECTS)

Chairman: H. R. Tolley, Bureau of Agricultural Economics
Papers: The Post Defense Agricultural Economy
John D. Black, Harvard University
Nutritional Science and Agricultural Policy
M. L. Wilson, United States Department of Agriculture
Discussion: Joseph S. Davis, Stanford University
J. F. Booth, Department of Agriculture, Canada
E. G. Nourse, Brookings Institution

12:30 P.M.—ANNUAL LUNCHEON

Chairman—W. I. Myers, Cornell University
Subject—Defense Jobs for Economists in Agriculture
Speaker—The Honorable Claude A. Wickard, Secretary of Agriculture

INDEX TO VOLUME XXIII
1941

SUBJECTS

A neglected point in the economics of the soil, 475
Agricultural credit, current problems in, 37
Agricultural economics, expanding scope of, 138
Agricultural efficiency, effect of tenure systems on, 185
Agricultural income, export subsidies and, 619
Agricultural labor unions, 456
Agricultural policy for hemisphere defense, An, 726
Agricultural programs, social conflicts and, 743
Agricultural situation, fundamental elements in, 712
Agriculture, American, and foreign markets, 1
Agriculture, America, effects of war and defense program on, 15
Agriculture and war and defense, 28
Agriculture, changing structure, and its impacts on labor, 89
Agriculture, economics of joint costs in, 771
Agriculture, modern, function of credit in, 52
Agriculture, structure, 109
Agriculture, the 1940 yearbook of, 446, 451, 454
Agriculture, U.S.D.A. 1940 yearbook of, 446, 451, 454
Agriculture, wage determination in, 71
Allen, William, Memorial of, 694
American agriculture in the new war and defense situation, 28
Annual meeting, preliminary program for, 938
Annual reports of association, 362
Application and uses of the graphic method of multiple correlation, 311

Census, agricultural, 271
Census, of 1940, highlights of, 266
Changing structure of agriculture and its impacts on labor, 89
Citrus fruit, problems of estimating, in Texas, 256
Citrus fruits in yield insurance plan, 867
Complementarity relations between fresh fruits, 421
Conservation adjustments, 632
Conservation—an objective or an ideal? 819
Conservation, progress of, 819
Conservation, soil, economics of, 467
Control in the sugar-cane industry of South Africa, 537
Correlation, graphic method of, in economics, 317
Costs, joint, economics of, in agriculture, 771
Cotton, 121, 131
Cotton, alternatives to, 124
Cotton, future of, in the economy of the South, 112
Cotton, future of, in U. S., 126
Cotton marketing, quality-price differentials in, 329
Cotton, quality-price differentials in marketing, 354
Credit, agricultural, 62, 65, 67
Credit, agricultural, current problems in, 37
Credit, function of, in modern agriculture, 52
Crops, Southern, estimating, 246
Curves, revenue, shape of total, 843

Dairy region, midwest, 632
Defense, foods for, 697
Defense, hemisphere, agricultural policy for, 726
Defense program and American agriculture, 15
Defense situation, American agriculture in the new war and, 28
Definitions in farm management, 369
Demand functions, 421
Development of "normal" citrus fruit yields by tree ages for use in a yield insurance plan, 867
Differentials in cotton marketing, 329
Duty, wool, aspects of, 399

Economics, institutional, in land economic theory, 161
Economics of joint costs in agriculture, 771
Effect of tenure systems on agricultural efficiency, 185
Estimating citrus fruit, in Texas, 256
Expanding scope of agricultural economics, The, 138
Expectation and performance—related to conservation and production adjustments in the midwest dairy region, 632
Export subsidies and agricultural income, 619

Farm benefit payments, 607
Farm labor unions, 833
Farm-management research, 232, 237
Farm-management research, orientation of, 218
Farm mortgage loans, insuring extra risk, 855
Farm tenancy, 291
Farmers in a changing world: The 1940 yearbook of agriculture, 446, 451, 454
Foods for defense, 697
Forecasting of fruit and nut production, 550
Freight-rate charges for movement of agricultural products, 434
Fruit and nut production, forecasting of, 550
Fruits, related demand functions of, 421
Function of credit in modern agriculture, The, 52
Fundamental elements in the current agricultural situation, 712
Future of cotton in the economy of the South, 112

Garey, Lewis F., memorial of, 936
Graphic method of correlation in economic analysis, place of and limitations to the, 317
Graphic method of multiple correlation, 311

Haul, length of, and relation to market prices, 434
Hemisphere defense, policy for, 726
Highlights of the 1940 census, 266

Income, agricultural, 619
Indexes on a type-farm basis, 584
Institutional economics in land economic theory, 161
Insurance aspects of extra-risk mortgage loans, 855
Insurance, yield plan, citrus fruits by tree ages in, 867
International situation and American agriculture, 1
Investigation on complementarity relations between fresh fruits, An, 421

Labor, changing agriculture and, 109
Labor, changing agriculture and its impacts on, 89
Labor unions, agricultural, problems of, 456
Land, agricultural, rent theory as it applies to, 145
Land economic theory, institutional economics in, 161
Land tenure, 185
Land tenure, legal aspects of, 173, 216
Legal aspects of land tenure, 173
Legislation, margarine, 557
Length of haul and farm commodity prices, 434
Loans, insuring extra-risk farm mortgage, 755
Low-income farms, orientation of farm-management research to, 218

Margarine legislation, 567
Meeting, annual, preliminary program for, 938
Memorial of Carl L. Alsberg (Edwin C. Voorhies), 535
Memorial of Lewis F. Garey (H. C. Filley), 936
Memorial of William Allen (J. F. Booth), 694
Methods of wage determination in agriculture, 71
Migration and resettlement in the Far Western States, 478
Mortgage, farm, loans, 855
Multiple correlation, 311

Needed research in farm tenancy, 291
Neglected point in the economics of soil conservation, 467
Neglected point in the economics of the soil, A: a reply, 475
Newly developing international situation and American agriculture, 1
News items, 531, 689, 930
Nut production, forecasting of, 550

Objective sampling in estimating Southern crops, 246
Organizational problems of agricultural labor unions, 456
Orientation of farm-management research to low-income farms, 218

Personnel, training, for the rural social sciences, 765
Place of, and limitations to the method, 317
Population, farm, sources and distribution of, 607
Preliminary program for the annual meeting, 938
Prices, farm commodity, 434
Problems in estimating Texas citrus fruit, 256
Problems of graduate students in rural social sciences, 324
Progress of tenure groups, 208
Publications received, 381, 502, 672, 904

Quality-price differentials in cotton marketing, 329

Recent developments among farm labor unions, 833
Reconsideration of rent theory as it applies to agricultural land, 145
Rent theory, as it applies to agricultural land, 145
Research, in farm tenancy, 291
Resettlement in Far Western States, 478
Revenue curves, shape of total, 843
Reviews, 384, 504, 673, 907
Rural social sciences, problems in, 324

Sampling, objective, 246
Scope of agricultural economics, 138
Seasonal patterns in tobacco prices, 339
Shape of total revenue curves, 843
Social conflicts and agricultural programs, 743
Social effects of the war and the defense program on American agriculture, 15
Social problems in Far Western States, 478
Soil conservation, economics of, 467
Some current problems in agricultural credit, 37
Some neglected aspects of the wool duty, 399
Sources and distribution of the farm population in relation to farm benefit payments, 607
South Africa, sugar-cane industry of, 537
Status and appraisal of research in farm tenancy, 277
Subsidies, export, 619
Sugar-cane industry, control in, of South Africa, 537

Tenancy, farm, needed research in, 291
Tenancy, farm, research, 304
Tenancy, farm, status and appraisal of research in, 277
Tenure groups, progress of, 208
Tenure, land, 216
Tenure, land, legal aspects of, 173
Tenure systems, effect on agricultural efficiency, 185
Terminology, report of committee, 369
Tobacco prices, seasonal patterns in, 339
Tobacco, seasonal patterns in prices of, 356
Training personnel for the rural social sciences, 765
Type-farm basis, indexes on, 584

Unions, agricultural labor, 456
Unions, farm labor, 833

Wage determination, methods of, in agriculture, 71
Wool duty, neglected aspects of, 399

Yearbook, U.S.D.A., 1940, 446, 451, 454

AUTHORS

(Articles are indicated by asterisk*)

Ackerman, Joseph
*Status and appraisal of research in farm tenancy, 277
See Reviews, 928
Adams, R. L.
See Benedict, M. R.
Aull, G. H.
Discussion: Future of cotton in the economy of the South, 121
See Reviews, 513
Aylesworth, Phillip F.
Discussion: Orientation of farm-management research to low-income farms, 239

Bakken, Henry H.
See Reviews, 926
Ballinger, Roy A.
Discussion: Quality-price differentials in cotton marketing, 354
Barton, Frank L.
*Length of haul and farm commodity prices, 434
Bausman, R. O.
See Notes, 899
Benedict, Murray R.
*Training personnel for the rural social sciences, 765
Benedict, M. R., and R. L. Adams
*Methods of wage determination in agriculture, 71
Bestor, Paul
Discussion: Function of credit in modern agriculture, 67
Bjorka, Knute
See Dowell, Austin A., 928
Black, A. G.
*Some current problems in agricultural credit, 37
Black, John D.
*American agricultural in the new war and defense situation, 28
*Fundamental elements in the current agricultural situation, 712
Bonnen, C. A.
Discussion: Alternatives to cotton production, 124

Boonstra, C. A.
See Notes, 793
Boonstra, C. A., and J. R. Campbell
See Notes, 657
Botts, Ralph R.
Development of "normal" citrus fruit yields by tree ages for use in a yield insurance plan, 867
Bowen, Howard R.
See Reviews, 676
Brandt, Karl
Discussion: Farm tenancy research, 304
Brannen, C. O.
Discussion: Legal aspects of land tenure, 216
Bunce, Arthur C., and Walter W. Wilcox
*Neglected point in the economics of the soil, a; a reply, 475
Bunce, Arthur C.
See Notes, 649

Campbell, J. R.
See Boonstra, C. A., 657
Canning, John B.
*Foods for defense, 697
Carlson, Reynold E.
See Raup, Hugh M., 680
Catherwood, M. P.
See Reviews, 512
Cavin, J. P.
See Reviews, 684
Childs, V. C.
*Problems in estimating Texas citrus fruit, 256
Christensen, Raymond P.
*Expectation and performance—related to conservation and production adjustments in the midwest dairy region, 632
Ciriacy-Wantrup, S. v.
*Economics of joint costs in agriculture, 771
Clark, Carl M.
*Seasonal patterns in tobacco prices, 339
Clawson, Marion, Carl P. Heisig and Edgar B. Hurd
*Forecasting of fruit and nut production, 550
Clement, S. L.
Discussion: Seasonal patterns in tobacco prices, 356
Collier, George W.
See Notes, 877

DeLoach, D. B.
See Reviews, 922
Dixon, H. M., and committee
Report on terminology, 369

Dowell, A. A.
See Reviews, 393

Ellis, Lippert S.
See Reviews, 395
Ezekiel, Mordecai
See Reviews, 510

Ferger, Wirth F.
See Reviews, 523
Fetter, Frank Whitson
*Some neglected aspects of the wool duty, 399
Filley, H. C.
Memorial of Lewis F. Garey, 936
Forster, G. W.
Discussion: Orientation of farm-management research to low-income farms, 236
Friedman, Milton
See Reviews, 389

George, James P.
See Notes, 668
Grigsby, R. M., and committee
Problems of graduate students in rural social sciences, 324

Hamilton, T. R.
Discussion: Problems in estimating Texas citrus fruit, 274
Hammar, C. H.
*Reconsideration of rent theory as it applies to agricultural land, 145
Hammerburg, D. O.
*Farmers in a changing world: The 1940 yearbook of agriculture, 451
Hannah, H. W.
See Notes, 895
Harris, Marshall
*Legal aspects of land tenure, 173
Hedges, Trimble R.
Discussion: Highlights of the 1940 census, 271
Heisig, Carl P.
See Clawson, Marion, and Edgar B. Hurd, 550
Hendrickson, C. I.
Discussion: Rent theory applying to agricultural land, 170
Hill, E. B.
See Notes, 499
Hobson, Asher
See Reviews, 395
Hoffman, A. C.
See Gold, N., 386
Hoffsommer, Harold
*Progress of tenure groups, 208
Hoos, Sidney
*Investigation on complementarity relations between fresh fruits, 421

Hopkins, John A.
*Changing structure of agriculture and its impacts on labor, 89
See Notes, 492
Horton, Donald C.
*Insurance aspects of extra-risk mortgage loans, 855
Howell, L. D.
*Quality-price differentials in cotton marketing, 329
Huffman, Roy E.
See Reviews, 920
Hurd, Edgar B.
See Clawson, Marion, and Carl P. Heisig, 550

Ise, John
Discussion: Institutional economics in land economic theory, 171

Jesness, O. B.
*Newly developing international situation and American agriculture, 1
See Notes, 873
See Reviews, 919
Johnson, Neil W.
*Conservation—an objective or an ideal? 819
See Reviews, 528
Johnson, O. R.
Discussion: Orientation of farm-management research to low-income farms, 232
Johnson, Sherman E., and Donald R. Rush
*Orientation of farm-management research to low-income farms, 218

Kelso, M. M.
*Needed research in farm tenancy, 291
Kifer, R. S.
See Reviews, 913
Kozlik, Adolf
*Shape of total revenue curves, 843
See Notes, 483, 654

Lange, Gunnar
*Neglected point in the economics of soil conservation, 467
Lipscomb, J. N.
See Reviews, 678
Linville, Francis A.
*Agricultural policy for hemisphere defense, An, 726

Maddox, James G.
See Reviews, 504
Malenbaum, Wilfred
*Indexes on a type-farm basis, 584
McCandliss, D. A.
*Objective sampling in estimating Southern crops, 246
McCarty, Dale E.
See Notes, 664
McCoy, John H.
See Reviews, 686
McEntire, Davis
*Migration and resettlement in the Far Western States, 478
Mengelberg, Kaethe
See Reviews, 386
Mickle, W. T.
*Margarine legislation, 567
Miller, Paul L.
See Reviews, 927
Mirkowich, Beatrice M.
See Tinley, J. M., 537
Moody, R. E.
See Notes, 646, 651
Mulliken, O. E.
Discussion: Methods of wage determination in agriculture, 104
Murchison, Claudius T.
Discussion: Future of cotton, 126
Murray, W. G.
Discussion: Function of credit in modern agriculture, 65

Nelson, Roger S.
*Export subsidies and agricultural income, 619
Norton, L. J.
Discussion: Agricultural credit, 62
*Farmers in a changing world: The 1940 yearbook of agriculture, 454
See Notes, 888

Parsons, Kenneth H.
*Social conflicts and agricultural programs, 743
See Reviews, 673, 909
Parsons, O. A.
See Kraenzel, Carl F., 920
Paulson, W. E.
See Notes, 496
Pettet, Z. R.
*Highlights of the 1940 census, 266
Pond, George A.
See Reviews, 391
Porter, H. S.
*Expanding scope of agricultural economics, The, 138
Post, R. E.
See Reviews, 518
Powell, Whiton
See Reviews, 520

Reid, Margaret G.
*Farmers in a changing world: The 1940 yearbook of agriculture, 446
See Reviews, 681
Renne, R. R.
See Reviews, 506
Roberts, Ralph W.
See Smith, T. Lynn, 607
Robotka, Frank
See Reviews, 520
Rosen, Laura
See Rosen, S. McKee, 913
Rush, Donald R.
See Johnson, Sherman E.

Salter, Leonard A., Jr.
See Reviews, 525
Sanford, A. Randall
See Holman and Sanford, 520
Saville, R. J.
Discussion: Changing structure of agriculture and its impacts on labor, 109
Schickele, Rainer
*Effect of tenure systems on agricultural efficiency, 185
See Reviews, 680, 682
Schloemer, F. C.
See Bacon, L. B., 395
Schwartz, Harry
*Organizational problems of agricultural labor unions, 456
*Recent developments among farm labor unions, 833
See Reviews, 384
Shepherd, Geoffrey
Notes on the discussion of the graphic method of multiple correlation, 322
Smith, Raymond C.
*Social effects of the war and the defense program on American agriculture, 15
Smith, T. Lynn, and Ralph W. Roberts
*Sources and distribution of the farm population in relation to farm benefit payments, 607
Southworth, Herman M.
See Reviews, 623
Stefferud, A. D.
See Reviews, 529
Stine, O. C.
*Future of cotton in the economy of the South, 112

Taueber, Conrad
See Reviews, 907
Timoshenko, V. P.
See Reviews, 516
Tinley, J. M., and Beatrice M. Mirkowich
*Control in the sugar-cane industry of South Africa, 537

Voorhis, Edwin C.
Memorial of Carl L. Alsberg, 535

Waite, Warren C.
*Place of, and limitations to the method, 317
See Notes, 884
Warren, Stanley W.
Discussion: Orientation of farm-management research to low-income farms, 237
Watson, Donald S.
See Burns and Watson, 506
Waugh, Frederick V.
See Gold, N., and A. C. Hoffman, 386
Wehrwein, George S.
*Institutional economics in land economic theory, 161
Wellman, H. R.
*Application and uses of the graphic method of multiple correlation, 311
White, Bennett S., Jr.
Discussion: Factors affecting foreign market for United States cotton, 131
Wilcox, Walter W.
See Bunce and Wilcox, 475
Williamson, Paul
See Reviews, 921
Wolcott, Leon O.
See Gaus, John M., 513
Wolcott, Leon O.
See Reviews, 515
Woodworth, Harry C.
See Reviews, 526
Working, Holbrook
See Reviews, 916

Young, E. C.
*Function of credit in modern agriculture, The, 52

NOTES

Benefit, farm, payments, 873
Coefficients of correlation of data drawn from a noncorrelated universe, 884
Comments on sampling to increase the usefulness of farm management research, 499

Common errors in evaluating farm practices, 877
Comparison of graphic and Pearsonian coefficients of correlation of data drawn from a noncorrelated universe, 884
Conservation, time preference and, 646
Correlation analysis of farm land values, 668
Cotton market, price-quality relations in, 496
Data, farm survey, 492
Distribution of farm benefit payments, 873
Evaluating, errors in, farm practices, 877
Experiment on the accuracy of farm survey data, An, 492
Family interest in the ownership of farm land, 895
Farm benefit payments, 873
Farm land, family interest in ownership of, 895
Farm management research, 499, 657
Farm survey data, 492
Farming, part-time, 893
Fats, Food Stamp Plan and, 483
Food Stamp Plan as applied to consumption of fats, 483
Incomes, relation of, to capital on farms, comment on, 888
Insurance, wheat yield, 664
Investigation on complementarity relations between fresh fruits, An: a reply, 654
Land classes, measure of some, 899
Land classification, land-use areas, and farm management research, 657
Land, ownership, family interest in, 895
Land-use areas, 657
Land values, correlation analysis of, 668
Lewis on relation of income to farm capital, 888
Market, cotton, price quality relations in, 496
Measure of land classes, 899
Merits and limitations of some of the measures of land classes, 899
Mr. Bunce on time preference and conservation, 646
Note on part-time farming, 893
Ownership, family interest in, of farm land, 895
Part-time farming, 893
Payments, distribution of farm benefit, 873
Price-quality relations in the cotton market of Victoria, Texas, 496
Rejoinder to Mr. Moody, on time preference and conservation, 649
Relation of income to farm capital, 888
Sampling to increase usefulness of farm management research, 499
Some aspects of the Food Stamp Plan as applied to consumption of fats, 483
Survey, farm, data, 492
Time preference and conservation, 646
Time preference and conservation; a rejoinder, 649
Time preference and conservation: a reply, 651
Wheat yield insurance, 664

BOOK REVIEWS

(Reviewer's name in parentheses)

Bacon, L. B., and F. C. Schloemer: *World trade in agricultural products. Its growth; its crisis; and the new trade policies* (Asher Hobson), 395
Blaisdell, Donald C.: *Government and agriculture* (M. P. Catherwood), 512
Blankertz, Donald F.: *Marketing cooperatives* (Whiton Powell), 520
Bureau of Home Economics: *Family income and expenditures* (Howard R. Bowen), 676
Burns, Arthur E., and Donald S. Watson: *Government spending and economic expansion* (R. R. Renne), 506

Campbell, Persia: *Consumer representation in the New Deal* (Margaret G. Reid), 681
Cummings, Richard Osborn: *The American and his food* (Herman M. Southworth), 923

De Vault, James W.: *Accounting for farm costs* (Neil W. Johnson), 528
Davis, Harold T.: *The theory of econometrics* (Holbrook Working), 916
Demareee, Albert Lowther: *The American agricultural press, 1819–1860* (A. D. Stefferud), 529
Diller, Robert: *Farm ownership, tenancy, and land use in a Nebraska community* (John H. McCoy), 686
Dowell, Austin A., and Knute Bjorka: *Livestock marketing* (Henry H. Bakken), 926

Farnsworth, Helen C.: *Wheat in the post surplus period, 1900–09, with recent analogies and contrasts* (D. B. DeLoach), 922
Frederick, John H.: *Public warehousing* (Wirth F. Ferger), 523

Galloway, George B., and associates: *Planning for America* (O. B. Jesness), 918
Gaus, John M., and Leon O. Wolcott: *Public administration and the United States Department of Agriculture* (G. H. Aull), 513
Gold, N., A. C. Hoffman, and Frederick V. Waugh: *Economic Analysis of the Food Stamp Plan* (Kaethe Mengelberg), 389

Hardy, Charles O.: *Wartime control of prices* (Mordecai Ezekiel), 510
Holley, William C., and others: *The plantation south, 1934–1937* (J. N. Lipscomb), 678
Holman, Charles W., and A. Randall Sanford, Editors: *American cooperation, 1940* (Frank Robotka), 520
Hopkins, John A.: *Changing technology and employment in agriculture* (Kenneth H. Parsons), 909
Hudelson, Robert R.: *Farm management* (George A. Pond), 391

Illinois Tax Commission: *Drainage district organization and finance, 1879–1937* (Joseph Ackerman), 928
International Labour Office: *Studies in war economics* (J. P. Cavin), 684

Kraenzel, Carl F., and O. A. Parsons: *Agricultural planning, its economic and social aspects* (*Montana Bul. No. 391*) (Roy E. Huffman), 920

Mendershausen, Horst: *The economics of war* (V. P. Timoshenko), 516
Mitchell, Donald R.: *Farm accounting* (Paul Williamson), 921
Monroe, Day, and others: *Family income and expenditures* (Howard R. Bowen), 676
Myrdal, Gunnar: *Population: a problem for democracy* (James G. Maddox), 504

N.Y.A. of Texas: *Cotton growing in Texas* (Lippert S. Ellis), 395

O'Donovan, John: *The economic history of live stock in Ireland* (A. A. Dowell), 393

Raup, Hugh M., and Reynold E. Carlson: *The history of land use in the Harvard forest* (Rainer Schickele), 680
Rosen, S. McKee, and Laura Rosen: *Technology and society* (R. S. Kifer), 913

Shepherd, Geoffrey, and others: *Power alcohol from farm products: its chemistry, engineering, and economics* (Harry C. Woodworth), 526
Special report by an Interbureau Committee and the Bureau of Agricultural Economics: *Technology on the farm* (K. H. Parsons), 673
Spiegel, Henry W.: *Land tenure policies at home and abroad* (Leonard A. Salter, Jr.), 525

Thomas, Dorothy S.: *Social and economic aspects of Swedish population movements, 1750–1933* (Conrad Taeuber), 907
Thompson, Sam H.: *Economic trends in livestock marketing* (Paul L. Miller), 927
Timoshenko, V. P.: *Wheat subsidization and exports, the experience of 1938–39* (R. E. Post), 518
Triffin, Robert: *Monopolistic competition and general equilibrium theory* (Milton Friedman), 389
Truman, David Bicknell: *Administrative decentralization* (Leon O. Wolcott), 515

Voechting, Friedrich: *Die binnen kolonisation in Italien* (Rainer Schickele), 682

Yates, P. Lamartine: *Food production in Western Europe* (Harry Schwartz), 384

THE CANADIAN JOURNAL OF ECONOMICS AND POLITICAL SCIENCE

The Quarterly Journal of the Canadian Political Science Association

Editors

C. A. CURTIS, R. MACG. DAWSON, J. A. CORRY, G. A. ELLIOTT

Managing Editor

V. W. BLADEN, *University of Toronto, Canada*

Annual Subscription	**$3.00**
Single Copies	**$1.00**

This Journal publishes articles on the economic, political and social problems of Canada and on the general theoretical issues raised by these problems. The Journal also contains reviews, notes on current Dominion and Provincial Legislation, and on Canadian official publications. Each issue will contain a bibliography of Canadian Economics.

Subscriptions may be sent to the publisher

THE UNIVERSITY OF TORONTO PRESS • Toronto, Canada

AMERICAN ECONOMIC REVIEW

Volume XXXI *Contents* September, 1941

Certain Problems in the Study of Costs.....C. Reinold Noyes
Werner Sombart and Transcendentalism.....Leo Rogin
Service Industries and Employment.....M. W. Reder
Transition to Commodity Reserve Currency.....Frank D. Graham
Economic Research in the Government.....Morris A. Copeland
Waterways versus Railways.....Harold Kelso
Pigou's *Employment and Equilibrium*.....Paul A. Samuelson

Communications, Reviews, Periodicals, Notes, and Thirty-eighth List of Doctoral Dissertations

The AMERICAN ECONOMIC REVIEW, a quarterly, is the official publication of the American Economic Association and is sent to all members. The annual dues are $5.00. Address editorial communications to Dr. Paul T. Homan, editor, AMERICAN ECONOMIC REVIEW, c/o Brookings Institution, 722 Jackson Place, N.W., Washington, D.C. (temporary address); all other communications to the Secretary, American Economic Association, Northwestern University, Evanston, Illinois.

THE ECONOMIC RECORD

The Journal of the Economic Society of Australia and New Zealand

Editor in Chief: D. B. COPLAND

Single copies 5/—(Australian). Annual Subscription 10/—(Australian).

The *Economic Record* publishes authoritative articles by recognised economists on economic, financial, labour and social conditions in Australia and New Zealand.

It is the only Journal in Australia which examines these questions from a scientific point of view.

A list of the most important contributions to the last number will indicate the value of the Journal to students of Australian and New Zealand affairs.

June 1941:

New Developments in Australia's War Economy.....E. R. Walker & R. M. Beecroft
Federal and State Income Tax.....H. S. Carslaw
Jevons in Sydney.....J. A. LaNauze
The Court of Arbitration in New Zealand.....W. R. Tuck
Australian Housing Policy: War and Post-War.....R. Mendelsohn
Recent New Zealand Data Regarding the Incomes of Individuals.....E. P. Neale
Seasonal Variations in Labour Requirements in Australian Industries.....F. R. E. Mauldon

Subscriptions should be sent to the publishers:

The Managing Director

THE MELBOURNE UNIVERSITY PRESS

Melbourne, N.3. Victoria. Australia

RURAL SOCIOLOGY

Official Journal of the *Rural Sociological Society*

Managing Editor: C. HORACE HAMILTON
North Carolina State College, Raleigh, North Carolina

Volume 6 SEPTEMBER, 1941 Number 3

Some of the leading articles are:

COUNTRY LIFE STUDIES AT THE UNIVERSITY OF WISCONSIN....*Henry C. Taylor*
FUNDAMENTAL CONCEPTS IN RURAL COMMUNITY STUDIES....*Rudolph Heberle*
FACTOR ANALYSIS IN SUBREGIONAL DELINEATION..*Margaret Jarman Hagood, et al.*
MEASURING ATTITUDE TOWARD RURAL AND URBAN LIFE....*F. Howard Forsyth*
EXTENSION OF URBAN CHARACTERISTICS INTO RURAL AREAS.....*E. T. Hiller*

RURAL SOCIOLOGY is published in March, June, September, and December. Membership dues in the society, including subscription, are $3.00 per year; subscription rates to non-members and libraries are $2.50 per year, single issue, $.75.

CARLE C. ZIMMERMAN, Harvard University.....Editor
ROBERT A. POLSON, Cornell University.....Society Secretary-Treasurer

THE JOURNAL OF POLITICAL ECONOMY

Edited by JACOB VINER and F. H. KNIGHT

Department of Economics, The University of Chicago

Leading Articles in the December, 1941, issue:

THE RELATION OF GOVERNMENT TO THE ECONOMY OF THE FUTURE - By *John Maurice Clark*

THE ROLE OF THE INDIVIDUAL IN THE ECONOMIC WORLD OF THE FUTURE - - - - - - - - - - - - - - - - - By *Frank Hyneman Knight*

THE FUTURE ROLE OF LARGE-SCALE ENTERPRISE - By *Theodore O. Yntema*

FRENCH AGRICULTURE AND THE INDUSTRIAL CRISIS OF 1788 - By *Alfred G. Pundt*

J. LAURENCE LAUGHLIN - - - - - - - - - - - By *Wesley C. Mitchell*

FOUNDED IN 1892. Published bi-monthly: February, April, June, August, October, December. Subscription $5.00 per year. Canadian postage, 25 cents; foreign postage, 55 cents. Single copies, $1.00.

The University of Chicago Press · 5750 Ellis Ave., Chicago, Ill.

ECONOMICA

VOL. VIII. Contents of the AUGUST 1941

N.S. No. 31 Issue

Rationing of Purchasing Power to Restrict Consumption — J. J. POLAK

Economic Incentive in Wartime — F. W. PAISH

The Two-Part Tariff — W. ARTHUR LEWIS

Maintaining Capital Intact — A. C. PIGOU

Maintaining Capital Intact: A Reply — F. A. v. HAYEK

The Counter-Revolution of Science. Part III — F. A. v. HAYEK

LONDON SCHOOL OF ECONOMICS & POLITICAL SCIENCE

WAR-TIME ADDRESS:

THE HOSTEL, PETERHOUSE, CAMBRIDGE

THE REVIEW OF ECONOMIC STUDIES

Vol. VIII, No. 3 CONTENTS June, 1941

Earnings & Prices, 1904, 1914, 1937-38.....*A. L. Bowley*
Rationing in Soviet Russia.....*E. M. Chossudowsky*
The Coal Question Reconsidered.....*H. W. Singer*
A Theorem on Technical Progress.....*M. Kalecki*
Rationing & the Cost of Living Index.....*N. Kaldor*

The object of the *Review* is to supplement the facilities for the publication of new work on theoretical and applied economics, particularly by younger writers, and to promote discussion by means of short notes of a kind which do not normally appear in other journals. It is published three times a year in October, February and June. Vol. IX (1941-42) will be published in two parts, in November and June.

Editorial communications, c/o Miss M. Bowley, The School of Economics, Dundee, Scotland; all other communications to The Secretary of the Review of Economic Studies, at New Court, Peterhouse, Cambridge.

The Annual Subscription to the *Review* is 7s6d post free.

Single numbers 2s6d (2s9d post free)

Vol. IX. 4s (4s3d post free)

Prices of early numbers on application.

THE SOUTH AFRICAN JOURNAL OF ECONOMICS

Editors

S. Herbert Frankel R. Leslie

Joint (Business) Editor

C. S. Richards

CONTENTS OF VOL. 9. NO. 2.
JUNE, 1941

WORLD MONETARY POLICY AFTER THE PRESENT WAR....M. H. de KOCK

MONETARY AND BANKING FACTORS AND THE BUSINESS CYCLE IN THE UNION.....T. W. de JONGH

NATIVE FARM LABOUR IN NATAL.....R. H. SMITH

FINANCING THE SOUTH AFRICAN WAR EFFORT:

I. THE INFLATION DANGER IN THE UNION—A COMMENT.....
P. H. GUENAULT, E. KAHN, R. J. RANDALL and J. N. REEDMAN

II. A REPLY.....S. T. VAN DER HORST

AUTHORITY AND ECONOMY IN WAR.....Professor R. LESLIE

Reviews: Notes and Memoranda: Union Official Publications: Recent Periodicals and New Books.

Single Copies at 6s. per copy obtainable from the CENTRAL NEWS AGENCY, LIMITED, and all leading booksellers.

Overseas Agents for subscriptions (1£. 1s. 0d. per annum) and Single Copies (6s. each) MESSRS. P. S. KING & SON, LTD., ORCHARD HOUSE, 14, GREAT SMITH STREET, WESTMINSTER, LONDON, S.W.1.

Subscriptions to the Journal, £1. 1s. 0d. per annum and enquiries re advertisement tariffs to the Chairman, Board of Management, P.O. Box 5316, Johannesburg.

THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

a quarterly founded in 1925 by Richard T. Ely and published by Northwestern University

Among the articles appearing in the November, 1941, or immediately succeeding issues are:

Some Observations on the Relation of Farm Land Tenure to Soil Erosion and Depletion ..... Otis T. Osgood

New Settlement in the Delta of the Lower Mississippi Valley ..... Philip E. Jones, John E. Mason, *and* Joseph T. Elvove

Attacking Low Income Problems in Rural Areas of New York State ..... Max E. Brunk

National Resources Board on Land Classification ..... V. Webster Johnson *and* William F. Musbach

Public Land Acquisition in Law and Practice ..... H. R. Briggs *and* A. R. McGinley

Notes on current developments in land economics and public utilities and reviews of recent books

Published in February, May, August, and November

Subscription—$5.00 ***Single Copies—$1.50***

337 East Chicago Avenue, Chicago, Illinois

AGRICULTURAL HISTORY

Designed as a medium for the publication of research and documents pertaining to the history of agriculture in all its phases and as a clearing house for information of interest and value to workers in the field. Materials on the history of agriculture in all countries are included and also material on institutions, organizations, and sciences which have been factors in agricultural development.

ISSUED QUARTERLY SINCE 1927

by

THE AGRICULTURAL HISTORY SOCIETY

Subscriptions, including membership: Regular, $3.00; student, $1.50; contributing, $10.00; life, $100 less age of applicant on last birthday.

Editor: Everett E. Edwards

Secretary-Treasurer: Arthur G. Peterson

Room 3901, South Building, 13th and C Streets SW
Washington, D.C.

Special rate of dues for young members

YOUNG PERSONS interested in the use of statistical information and analysis are welcome to join the AMERICAN STATISTICAL ASSOCIATION at the special introductory rate of $3.00 for the first year.

New members under 30 years of age are eligible at this reduced rate.

The privileges of membership include the quarterly *Journal*, the *Bulletin* published six times a year, and attendance at the Annual and Chapter Meetings.

Write the Secretary for more information and application forms—

American Statistical Association
1626 K Street, N.W. Washington, D. C.

1941 Annual Meeting

THE AMERICAN FARM ECONOMIC ASSOCIATION

Headquarters: Hotel Commodore
New York City
December 27, 28, 29, and 30

The Allied Social Science Associations are meeting together this year. The Biltmore, the Roosevelt, and the Commodore Hotels have been designated as headquarters. All rooms in each of the three hotels are available at the same rates:

Single room with bath, $3.00
Double room with bath, $5.00

In order to facilitate hotel registration, reservations should be made in advance.

Members of the American Farm Economic Association are requested to register at the Association's registration desk at the Commodore Hotel as soon as convenient after arrival.

Further information will be furnished by letter around December 1.

See preliminary announcement of the program, pages 938-943 this issue of the Journal.

THE AMERICAN FARM ECONOMIC ASSOCIATION

President
M. R. BENEDICT
University of California

Vice-Presidents
SHERMAN E. JOHNSON
Bureau of Agricultural Economics

L. J. NORTON
University of Illinois

Secretary-Treasurer
ASHER HOBSON
University of Wisconsin

Editor
T. W. SCHULTZ
Iowa State College

Assisted by
J. A. HOPKINS, JR.
W. G. MURRAY
And other members of the staff in agricultural economics at Iowa State College

Assistant to the Editor
FLORENCE W. NICHOLS

Editorial Council

M. R. BENEDICT, University of California

J. D. BLACK, Harvard University

J. S. DAVIS, Food Research Institute, Stanford University

MORDECAI EZEKIEL, Department of Agriculture

F. F. HILL, Cornell University

R. R. RENNE, Montana State College

R. J. SAVILLE, Louisiana State University

O. C. STINE, Bureau of Agricultural Economics

WARREN C. WAITE, University of Minnesota

G. S. WEHRWEIN, University of Wisconsin

The JOURNAL OF FARM ECONOMICS is published quarterly, February, May, August and November by The American Farm Economic Association. Yearly subscription $5. Published at Menasha, Wisconsin.

Editorial communications including manuscripts submitted for publication, books for review or inquiries concerning the JOURNAL should be addressed to T. W. Schultz, Department of Economics and Sociology, Iowa State College, Ames, Iowa.

Applications for membership or inquiries regarding the general affairs of the Association should be addressed to Asher Hobson, Department of Agricultural Economics, University of Wisconsin, Madison, Wisconsin.

GEORGE BANTA PUBLISHING COMPANY, MENASHA, WISCONSIN